

ARABLE FOCUS

THE JOURNAL FOR THE CEREALS AND OILSEEDS INDUSTRY

**Get closer to the
Farm Excellence
network**

**11,000+
combinable
crop enterprises
analysed**

**DELIVERING
THE FUTURE
OF FARMING**

Your levy in action (AHDB strategy)



Contents

3 Welcome

INSIGHTS

4 Delivering the future of farming Your levy in action

6 Farmbench results: past, present, and future Analysis of over 11,000 combinable crop enterprise performance results

AGRONOMY

8 Insecticide resistance status never stands still A monitoring project hunts for signs of trouble in crop pests



10 Easy-peasy: rapid soil phosphate test A low-cost, rapid nutrient test is under development

12 The smart pest monitoring tool with 'eyes' and a 'brain' Clever tech counts crop beetle pests

14 A 'ubiquitous' future for early crop disease detection? Unlocking ubiquitination could open disease-management doors

16 Students' union: lower nitrogen milling wheat

A PhD project aims to put less nutrient-hungry bread-making wheat on the table



MARKETS

18 Animal feed: demand for domestic cereals How livestock sector pressures may reduce demand for feed grain

20 Raising the profile of UK grain in Morocco Consumers literally take the biscuit

OVER THE HEDGE

22 News from across AHDB Cross-sector activity

FARM EXCELLENCE

23 Get closer to Farm Excellence At-a-glance information about our on-farm activity

24 To graze or not to graze On-farm arable trials with sheep

25 Flowering habitats for pest control How to influence beneficial insects

26 Regenerative agriculture Is it just good long-term husbandry?

27 Cultivation and establishment costs The price of various strategies

28 Will winter wheat blends win? Farmers pit a variety blend against a standard crop

29 Monitor farmer tests living mulches Rob Waterson hopes to increase the resilience of his system

30 Dirty laundry aired? Tough topics tackled at Monitor Farms



AHDB

Produced for you by:

AHDB, Stoneleigh Park,
Kenilworth, Warwickshire CV8 2TL

T 024 7669 2051

E comms@ahdb.org.uk

W ahdb.org.uk



If you no longer wish to receive this information, please email us on the address above.

AHDB is a statutory levy board, funded by farmers, growers and others in the supply chain. We equip the industry with easy to use, practical know-how which they can apply straight away to make better decisions and improve their performance. For further information, please visit ahdb.org.uk

© Agriculture and Horticulture Development Board 2022. All rights reserved.

Welcome

AHDB continues to change to better represent your needs. In May, thousands of you participated in the Shape the Future vote. The responses and comments indicated the areas of work you felt were most important (Page 4). It also provided a mechanism to ratify new members of the Cereals & Oilseeds Sector Council.



Based on the results, your council has created a plan for AHDB Cereals & Oilseed activity. Available on 10 November 2022, it will set the focus for the next few years and explain how our operations will change. The plan will guide levy investment to address knowledge or research gaps that would otherwise not be filled effectively.

This autumn, Defra will recruit a new AHDB board member with expertise in cereals and oilseeds production. It is a critical role. Appointed by ministers, the chair will lead your sector council for the next three years. Keep your eyes open for the advert, and please highlight the opportunity to anyone you think would be a great candidate.

This edition of Arable Focus emphasises our Knowledge Exchange (KE) managers (Pages 23–30). It describes how they work in the regions alongside farmers in the Monitor Farm and Strategic Cereal Farm network. They also participate in many other forums to support farmers who want to learn from each other. The team is passionate about promoting AHDB research and services and putting what we do into an on-farm context. If you would like to talk about AHDB's information or provide feedback on what works well and what does not, please contact a member of the KE team (see the back page for contact information) or sector council (Page 5). It is important that we hear your opinions on what we do.

Finally, it would be remiss of me not to comment on the fertiliser situation. High gas prices continue to disrupt fertiliser production. It is impacting many farmers across many countries, with delays in some orders arriving on farm. We are keeping a close eye on the situation and will continue to publish information to support the industry. It is essential that farmers have the best information to support decisions to reduce fertiliser applications, whether due to a physical lack of it or high prices.

Stephen Briggs

Interim Cereals & Oilseeds Sector Council chair
and AHDB board member



Delivering the **FUTURE OF FARMING**

This spring, levy payers had a say on AHDB's work. Ken Boyns explains how your voices will help put your levy in action.



© Dreamstime (161606183)

We asked all levy payers to rank AHDB work priorities in terms of importance to the cereals and oilseeds sector (from 1 to 5, where 1 is low and 5 is high).

THE RESULTS*

- Recommended Lists **(4.3)**
- Education **(4.0)**
- Integrated pest management **(3.9)**
- Nutrient management and soils **(3.9)**
- Industry reputation **(3.9)**
- Exports **(3.9)**
- Basic Payment Scheme reduction **(3.6)**
- Environment **(3.6)**
- People in agriculture **(3.6)**
- Grain passport **(3.3)**

Rapid analysis

With all scores higher than 3.0, no area was considered a low priority although some were stronger than others. In addition to rating priorities, the questionnaire asked for thoughts and opinions. A wide variety of comments were captured and some clear messages were received. Although people believed the priorities were aligned with their needs, many expressed the desire to see improvements in how AHDB delivers its work.

Trusted products, tools and services will continue to be delivered by AHDB's teams. With the Recommended Lists (RL) topping levy payers' priority list, this valued service will remain firmly in the plan.

However, activity will not stay the same. The agricultural industry is moving. AHDB must move with it and never switch off its 'listening mode'. We will work closely with industry to review our activity and in partnership to efficiently answer farming's pressing questions. What hasn't changed is our desire to ensure that any solution is unbiased, independent, practical, and based on evidence.

A recent example of AHDB's stakeholder engagement is the digital grain passport (ahdb.org.uk/grain-passport), which aims

*One levy payer, one vote (unweighted) Shape the Future results.

to eliminate the need for paper passports. This will only proceed if it has strong support from all parts of the supply chain. With a Shape the Future score of 3.3, this initiative received the lowest score. It is important that the industry fully understands the potential electronic system before it decides on whether to support it or not.

Detailed results

Over the summer, the AHDB Cereals & Oilseeds Sector Council and AHDB board reviewed the results. They are currently putting the finishing touches on the five-year plan to put your levy in action. You are invited to discuss the plan at the 'Delivering the future of farming' event on 10 November 2022 (online).

For booking and programme information, visit ahdb.org.uk/events

For further information, contact:

Ken Boyns

Divisional Director – Services
ken.boyns@ahdb.org.uk

To get in touch with AHDB staff, AHDB board members and AHDB Sector Council members, email: info@ahdb.org.uk



Delivering the future of farming

Thursday 10 November 2022

Join us to see your levy in action

© John Eveson

Your Cereals & Oilseeds Sector Council

Interim Council Chair and AHDB board member

Stephen Briggs: a farmer, farm-shop retailer and farm business consultant, with an MSc in soil science. In 2020, Stephen was judged to have most influenced the agricultural industry in the 10 years since his Nuffield Farming Scholarship, receiving the prestigious Bullock Award.

Council members

David Bell: a mixed farmer in East Fife, with a strong interest in research and integrated pest management.

James Standen: a mixed farmer and Farms Director for Newcastle University, with a BSc in Agriculture and an MSc in Agricultural Economics, and an interest in low-input systems.

David Walston: a Cambridgeshire farmer who has fully adopted conservation agriculture, with a degree in biology and a Nuffield Scholarship on soil health.

Tom Clarke: a fourth-generation fenland arable farmer, with a degree in economics, an MBA, and business consulting experience.

Tony Bell: an arable farmer from North Yorkshire, with in-depth experience of commodity purchasing and feed production.

Russell McKenzie: an arable farmer based on the Cambridgeshire/Bedfordshire border. A former AHDB monitor farmer and a Nuffield Scholar, he is passionate about new approaches to farming, including no-till.

Polly Davies: a mixed organic tenant farmer in South Wales, with an interest in agri-environmental management options and whole-farm systems.

Cecilia Pryce: Head of Compliance, Shipping, and Research at Openfield, with a BSc in Agricultural Economics and extensive experience of the global cereals markets.

Julius Deane: Wheat Director at Carrs Flour Mills and member of the UK Flour Millers Wheat Committee, with a BSc in Agriculture, and extensive farming, grain trade and food-sector experience.

Sarah Nightingale: a self-employed consultant with a BSc in Agriculture and an MSc in Agricultural Economics, and extensive experience in the grain and feed industries.

Patrick Stephenson: an independent crop consultant, past chair of the AICC and a founder member of the Global Alliance of Independent Agricultural Consultants.

For more detailed information about sector council members, please visit: ahdb.org.uk/cereals-council

Farmbench results: past, present and future



Mark Topliff uses Farmbench data to illustrate how crops performed in 2021, and to provide costings estimates for 2022 and a forecast for 2023.

Conventional combinable crop enterprise performance results (11,584) were analysed in Farmbench (ahdb.org.uk/farmbench) for the 2017 to 2021 harvest years.

Results are presented across three performance groups: top 25%, middle 50% and bottom 25% – based on full economic net margin.

Higher costs and prices

Although yields in 2021 were close to the previous four-year averages, they averaged consistently higher in the top 25%. With an upward trend in reported prices received for most crops since the 2019 harvest year, the top 25% saw income increase by around £500 to £800 per hectare (crop dependent).

On average, the lowest variable costs (2017–21) were associated with beans, linseed and oats. The highest were associated with winter barley, oilseed rape and wheat. In 2023, fertiliser costs may be around three and a half times higher than in 2021, potentially doubling the variable costs in heavy-input crops. Averaging across all crops, 2022 costs are estimated to be 15% higher, followed by another hike of 32% for harvest 2023.

Total costs of production have generally increased, by 6% on average (2017–21), for the middle 50%. Usually, this group's gross margins were 40% lower than the top performers. For example, there was a £300 and £350 per-hectare difference in winter wheat and winter oilseed rape, respectively.

Wheat and winter oats had the highest total per-hectare overheads, with a 2% increase over the five years. Most crops saw an 11% to 15% rise over the period. Generally, overheads account for two-thirds of the total cost of production. For most crops, the top 25% group total overheads were less than 60% of the crop income – for wheat, barley, and oilseed rape this falls to under 40%.

In all performance groups, winter wheat, oilseed rape and oats returned the best average net margins (2017–21). In the middle 50% group, winter feed wheat margins could increase by around 66% in 2022, if forward prices are realised. In 2023, these could drop back 83% to £150 per hectare. A big increase is not expected for spring feed barley in 2022. In 2023, the crop may achieve a loss of £300 per hectare after all costs. Oilseed rape may experience a loss of £234 per hectare.

Conclusion

Holding on to profits from 2022 will prove difficult, with generally higher working capital required to purchase inputs for harvest 2023 crops and, in England, the reduction in basic payments.

Grain prices are likely to remain volatile into the 2022/23 marketing year, with marketing strategies having an even greater influence on margins in 2022 and 2023.

This article is part of an extensive analysis, which includes details of how the figures were calculated. To inform your farm's strategy, access the article at ahdb.org.uk/farmbench-2022

For further information, contact:

Mark Topliff
AHDB Lead Analyst – Farm Economics
mark.topliff@ahdb.org.uk

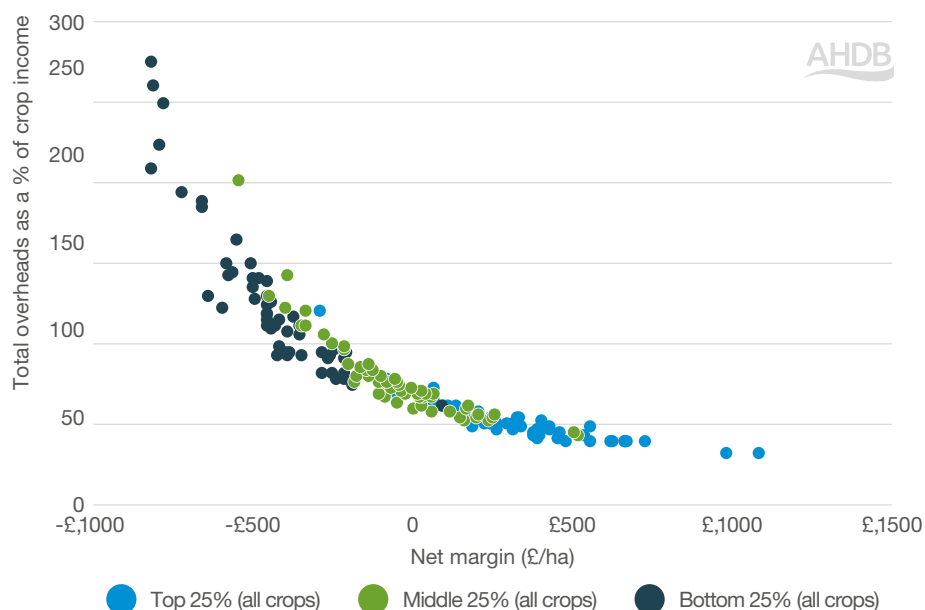


Figure 1. The key financial drivers of net margin are yields and overhead costs. Therefore, there is a close relationship between net margin and overheads as a percentage of income. Each dot on the chart represents the average results for a crop in a performance group and harvest year. As overheads as a percentage of income reduce, net margin increases

TOP TIPS

- Use Farmbench figures to benchmark your crop's production costs
- Calculate the effect of higher input prices on your crops' cost of production
- Put aside profits from 2022 to help with the working capital for the 2023 harvest year
- Aim towards a higher performance group category (preferably the top 25%)
- With increased price volatility and high input prices, the last point is more important than ever

Table 1. The full economic cost of production by crop for Farmbench middle 50% (£/ha)

Crop	2017	2018	2019	2020	2021	Five-year average	2022 estimate ¹	2023 forecast ²
Oats – spring	913	903	891	874	907	897	1,050	1,419
Beans – winter	868	917	943	951	958	927	1,052	1,296
Linseed – mixed	867	916	952	1005	973	942	1,082	1,396
Oats – winter	930	967	965	1,005	1,017	977	1,189	1,622
Beans – spring	907	968	1,042	996	1,018	986	1,184	1,378
Peas – feed, mixed	1,070	847	1,066	996	999	995	1,095	1,358
Barley – winter	1,045	965	1,118	1,121	1,042	1,058	1,247	1,712
Wheat – spring	990	1,070	1,046	1,121	1,133	1,072	1,321	1,785
Barley – spring	1,041	1,098	1,083	1,108	1,083	1,083	1,268	1,712
Oilseed rape – winter	1,142	1,129	1,196	1,276	1,207	1,190	1,428	1,968
Wheat – winter	1,231	1,287	1,308	1,287	1,256	1,274	1,484	2,049

¹Based on year-on-year change in Defra Agricultural Price Index average of 15%.

²Based on forecast ag-inflation average of 32% and assumed reduced usage of inorganic fertiliser.

Insecticide resistance status **NEVER STANDS STILL**

An insecticide resistance monitoring project hunts for signs of trouble. Jason Pole, who leads on AHDB's crop protection communications, examines the latest findings.



Around 10 years ago (April 2012), the latest phase of an insecticide resistance monitoring project began.

The Rothamsted Research-led work uses insects sent in from the field and exposes live samples to insecticide compounds at various screening doses. When compared to the expected mortality (from known insecticide-susceptible baselines), they can rapidly detect signs of resistance. Critically, in any sample, they can rule it out – helping to indicate that poor control is due to some other aspect of management.

The team has now accrued baseline bioassay data for many aphid pests and insecticides. This precious strategic resource can be used to rapidly assess potential efficacy shifts.

The screens do not require knowledge of the underlying genetic resistance mechanisms. However, where mechanisms are known, the team turns to DNA-based tools to identify which ones are present, and the frequency at which they occur. The most-studied pest is the virus-transmitting peach-potato aphid, with resistance data stretching back to 1996.



Peach-potato aphid

Pyrethroids

The 2021 screens on peach-potato aphid continued to detect strong pyrethroid resistance, associated with the super-kdr target site resistance mechanism, in many samples. DNA-based tests showed that the latest form – super-kdr (north European, Ne) – is widespread in the UK (found in 71% of the 2021 samples). The presence of kdr (which confers moderate resistance to pyrethroids) was also found in 24% of the 2021 samples. The frequencies of these resistances are close to the levels observed in 2020.

Pirimicarb

The team also continues to detect resistance to pirimicarb (conferred by MACE) in UK peach-potato aphid populations. The continuation of MACE in UK samples, despite the loss of pirimicarb as an authorised active ingredient in most UK crops, may be due to the resistance mutation 'hitch hiking' alongside super-kdr in the UK's aphid 'super clones'.

Organophosphates

For the first time during this project, the team did not detect high (R2) or extreme (R3) esterase-based resistance in peach-potato aphids collected from open-field crops. The result suggests that the esterase-based resistance mechanism is being selected against now that organophosphate compounds are no longer used in the UK. This is referred to as a 'fitness cost'.

Other compounds

For several other key compounds, the 2021 screens on peach-potato aphid samples found no evidence of resistance at levels that may compromise control. In fact, there was no evidence of any significant shifts in sensitivity from most of the diagnostic baselines.

Neonicotinoids

However, a worrying, albeit subtle, susceptibility shift to neonicotinoids in an aphid sample was detected (collected from oilseed rape in November 2021). This was equivalent to metabolic-based resistance (Nic-R+) and it is the first time this phenotype (moderate resistance) has been observed in the UK. Additionally, strong (Nic-R++) neonicotinoid target site resistance in peach-potato aphid has been detected in southern Europe and North Africa. Recently, it has also been detected on sugar beet in Belgium, moving this resistance threat closer to our shores.

Resistance origins

In peach-potato aphids, rarer combinations of insecticide resistance mechanisms/genotypes are found significantly more often in samples collected from protected crop sites compared to open-field sites, according to the researchers. Some aphids in protected environments are thought to originate from more genetically diverse, sexually reproducing populations on imported plant material. Consequently, it is essential to keep a close eye on this potential gateway for new forms of resistance.

Other pests

Grain aphid: Levels of pyrethroid resistance are not greater than moderate. This means control failures are unlikely to occur if resistance management guidance is followed. This includes applying products at full recommended label rates with good aphid contact.

Bird cherry-oat aphid: No evidence of either resistance or reduced sensitivity to pyrethroids in the UK.

Cabbage stem flea beetle: The frequency of pyrethroid-resistant beetles (conferred primarily by a metabolic mechanism) has risen consistently over several years. There no longer appears to be a geographical resistance 'hotspot' in England. However, it is worth noting that a Scottish sample (taken in 2020) was fully susceptible to pyrethroids.

Resistance guidance

The Insecticide Resistance Action Group (IRAG) considers the results from the resistance screening work and issues updates to its management guidance each year. Integrated Pest Management (IPM) approaches, which balance non-chemical and chemical control, are at the heart of the guidelines published at ahdb.org.uk/irag

This article is based on information in the latest (2021–22) project report.

For further information, contact:

Jason Pole

AHDB Marcomms Manager
(Cereals & Oilseeds)
jason.pole@ahdb.org.uk





Easy-peasy: **RAPID SOIL PHOSPHATE TEST**

A low-cost, rapid nutrient test is under development at Rothamsted Research. Amanda Bennett describes the progress.



© AHDB

It may soon be possible to determine soil phosphate status relatively quickly – without leaving the field.

Determination of available phosphorus (P) concentrations often involves paying laboratories to analyse soil samples – using a standard (Olsen) method. It can take several days for information to be returned, so a rapid (and cheaper) way to check a field's nutrient status would be welcomed by many farmers and agronomists. The need for such tests is increasing too. For example, soil analyses are now required every 3–5 years in England under the Farming Rules for Water.

With a prototype test kit (shown on opposite page) already in hand, the researchers recruited a team of a dozen applied minds (advisors, researchers, and environmental protection officers) to trial the approach and suggest how it could be improved.

In total, 82 soil samples (from numerous soil types) were taken by the project's participants and used to compare the performance of the test kit against the standard laboratory method.

Most of the samples (56/82) were associated with Olsen P indices at index 3 or above. For cereals, the AHDB Nutrient Management Guide (RB209) recommends that no fertiliser or manure P is applied to soils at index 3 or above. The results reinforce the importance of

conducting soil P assessments at regular intervals – so nutrients are only ever applied in response to crop needs. Most participants were already aware of the location of high P soils in their fields. During this research, high P soil results from the test kit frequently tallied with the expectations of the testers.

Accurate measurement of Olsen P, even when carried out in a laboratory, is notorious for being difficult. However, the relationship between the in-field kit and laboratory results was good – demonstrating the potential of the rapid approach to guide fertiliser decisions.

The group's feedback helped the researchers identify ways to improve the kit, including:

- Clearer instructions on sampling and filtering
- Provision of extra consumables (such as pipettes and filter holders)
- Guidance on when further dilution is required to deal with high-P samples

Following refinement of the kit, the researchers intend to widen the approach to measure other soil chemical properties, such as potassium and carbon.

For further information, contact:

Amanda Bennett
Senior Environment Scientist
amanda.bennett@ahdb.org.uk

AHDB/BBSRC NET-ZERO PARTNERSHIP

The projects on pages 10–15 formed part of an AHDB/BBSRC partnership that aimed to support the agricultural transition to net zero. Project costs were met through BBSRC's Farm Sustainability Fund. The partnership supported ten projects that addressed priorities identified by farmers, including ways to cut greenhouse gas emissions and increase carbon storage.

ahdb.org.uk/net-zero-partnership



**Biotechnology and
Biological Sciences
Research Council**

Part of UK Research and Innovation (UKRI), the Biotechnology and Biological Sciences Research Council (BBSRC) invests in world-class bioscience research and training.



The smart pest monitoring tool with 'eyes' and a 'brain'



Kristina Grenz explains how a trained tool can recognise crop beetle pests.

Researchers have tackled an Achilles heel associated with the control of a particular group of pests – the nocturnal ones that scutter about when humans like to rest.

Such night-time movements mean that pests can fly (crawl or wriggle) under the radar. By escaping detection, they are freer to inflict yield and quality losses on crops. Growers often only become aware of the presence of damaging pest populations after it is too late to avoid significant economic losses.

Numerous crop pest species are active at night, including the notorious cabbage stem flea beetle in oilseed rape and (black) vine weevil in horticultural (especially soft fruit and ornamental) crops.

With options reducing for broad-spectrum synthetic insecticides, some of the control slack needs to be picked up by products with a biological nature – such as entomopathogenic nematodes and fungi to target soil-dwelling pest larvae (where available).

However, such IPM-friendly options need to be targeted carefully, with effective pest monitoring strategies essential for optimum management. It is why a 24/7 automated monitoring solution would come in handy.

The science of 'smart'

The science of automated pest monitoring is in its infancy. With any foray into new technology, the start of the path is often fraught with issues. Certainly, initial attempts spawned a first generation of largely unreliable and difficult-to-use prototypes.

With a track record of investment in precision solutions for agriculture and horticulture, the team at Harper Adams University was well placed to create a tool that was effective and low-cost.

Partly due to its status as a global horticultural pest, they used adult vine weevil beetles to develop a prototype tool. With proof of concept established, it would be relatively easy to adapt the tool to monitor some other pest species.

Monitoring adult beetles is key because they are relatively easy to see. Generally, beetle larvae feed out of sight – with vine weevil larvae adopting a subterranean lifestyle and cabbage stem flea beetle larvae feeding inside the foliage.

At the heart of the tool is a commercially available traditional pitfall trap, which lures in and traps vine weevil beetles. The team modified the trap to provide easier access for beetles and primed it to be 'smart' (see image below) by installing a relatively low-cost 'brain' (onboard computer) and 'eyes' (camera and light-ring).

It was not born 'smart', however. The team needed to train it to understand what it was seeing. They used the tool to take 1,499 images. Of these, 1,300 contained at least one adult vine weevil and 199 contained at least one earwig (to act as a negative control).



AHDB/BBSRC NET-ZERO PARTNERSHIP

This project formed part of an AHDB/BBSRC partnership (see page 10).

Project results

Following training, the smart monitoring tool reliably identified the presence of adult vine weevil in laboratory and semi-field environments, with 85% accuracy in the laboratory tests (Figure 1). The retrofitted components were found not to negatively affect the beetle-trapping operation of the original trap. Due to the movement of beetles within traps, the smart trap is unable to count insect numbers. Currently, it only confirms that at least one individual is present.

Although it requires further development before it is ready for commercialisation, this work provided the first report of such technologies being specifically developed for vine weevil management. Ultimately, it is hoped that a refined tool will calculate pest populations and let growers know when control is required.

For further information, contact:

Kristina Grenz
Crop Protection Scientist
(Pests and Weeds)
kristina.grenz@ahdb.org.uk



Figure 1. A representative montage of 25 images captured by the 'smart' monitoring tool along with their classification (weevil = vine weevil) and the model confidence in this classification (1 = highly confident)



A 'ubiquitous' future for early crop disease detection?

New research could help revolutionise the way disease is detected – and it's all about 'ubiquitination', according to Catherine Harries, who manages crop disease research at AHDB



Despite diseases infecting crops for hundreds of years, relatively little is known about the way plants respond to attack. Led by Beatriz Orosa at the University of Edinburgh, new research results have delivered a far better understanding of natural defences (the immune response) in a commercial crop – spring barley.

The immune response

The coronavirus pandemic has ensured that 'immunity' has been a hot topic of conversation for almost three years. Inevitably, the complex processes associated with it are different in plants than in animals. However, photosynthetic organisms do also possess defence systems and examining how they work may unlock new approaches to disease control.

But it is not an easy area of science – especially when the dynamic interactions

between the pathogen and the host are considered. A successful immune response requires the crop to recognise the signs of attack and unleash an array of pathogen-countering responses. And interactions are not static. Pathogens constantly evolve to avoid host resistance (or any other plant protection strategy). For example, some pathogens adapt and release molecules to suppress host immune responses to increase the chance of successful infection.

The ubiquitin pathway

To research this complex area, it is important to keep things as straightforward as possible. The team's preliminary work focused on *Arabidopsis thaliana*. From the mustard family, this small plant is a favourite for plant studies. From a genetic perspective, it is a relatively simple plant – it is also easy and quick to grow. They investigated the

ubiquitin pathway – a brow-furrowing pathway in terms of its complexity – which is associated with two key technical terms:

Ubiquitin: a protein found in many organisms involved in the regulation of plant immune responses.

Ubiquitination: a fast and reversible protein modification that regulates the type, strength, and speed of the immune response.

The ubiquitin pathway was found to be essential in the activation of the immune response in *Arabidopsis thaliana*.

Barley brown rust

The latest project explored whether the ubiquitin pathway is similar in other plants, specifically in those of commercial interest – such as spring barley infected by the brown rust pathogen.



Brown rust tends to be more problematic in winter barley. This has given breeders extra incentive to bolster resistance to the pathogen – with disease resistance scores of up to 8 in the Recommended Lists (2022/23), compared to a maximum of 5 for spring barley. As a result, the researchers focused on spring barley to help lead to strengthened defence.

When two plant stress hormones (salicylic acid (SA) and jasmonic acid (JA)) were applied to spring barley varieties, the researchers observed an accumulation of ubiquitinated proteins – like the responses observed in arabidopsis. They identified 146 and 67 SA-dependent and JA-dependent ubiquitinated proteins, respectively.

Field trial results also showed a general ubiquitin-mediated immune activation in all barley varieties infected by the brown rust pathogen. This implies that ubiquitin regulation of the immune system is a

conserved mechanism across cultivars. Furthermore, the accumulation of ubiquitin targets correlated with the performance in the field trial, suggesting widespread substrate ubiquitination is a key aspect of the immune response.

Their results indicate that the development of markers for ubiquitination could be used to quantify early pathogen infection. The team plans to design a method, which uses a green fluorescent protein (GFP), to measure the accumulation of ubiquitinated proteins during infection. It is a tantalising prospect – monitoring activity within this pathway could lead to a major advance in disease management.

In theory, it is possible to detect infection long before visible symptoms appear in crops, helping to facilitate protectant fungicide use. Rapid detection would also help speed up plant breeding programmes.

AHDB/BBSRC NET-ZERO PARTNERSHIP

This project formed part of an AHDB/BBSRC partnership (see page 10).

For further information, contact:

Catherine Harries
AHDB Senior Crop Protection Scientist
catherine.harries@ahdb.org.uk



© Dreamstime (32000092)

Students' union: Lower nitrogen milling wheat

A PhD project aims to put less nutrient-hungry bread-making wheat on the table. Dhan Bhandari explains.



Cutting back on fertiliser is not easy in high-stakes milling wheat production. Certainly, if a milling wheat variety consistently produced the right amount and right kind of protein at a low nitrogen rate, it would stand out on the Recommended Lists (RL).

Protein puzzles

However, delivering such a variety is a particularly tough nut to crack. As the right quantity and quality of flour protein are paramount, the industry standard is set at 13% grain protein. This ensures that grain delivers the consistent strength needed for bread-making flours.

Lowering this standard value is not straightforward, as it may impact adversely on dough properties. For low nitrogen milling wheat varieties to become a commercial reality, it is essential to tackle complex crop genetics and, critically, understand environmental interactions better.

Based at Rothamsted Research, an AHDB PhD student, Rohan Richard, has nestled himself in a team well-versed in tackling the low nitrogen bread-making wheat challenge. The studentship commenced in 2019, the same year an intriguing AHDB-funded report was published. Also conducted at Rothamsted Research, the multi-year, multi-site, multi-nitrogen-rate and multi-genotype study (ahdb.org.uk/low-protein-wheat-for-bread-making)

identified varieties that deliver good bread-making performance at relatively low rates of nitrogen fertiliser.

Two key factors were at the heart of the good performance. The varieties tended to move nitrogen more efficiently into grain and produced better quality protein – specifically, an increase in the proportions of glutenin in gluten (resulting in greater dough elasticity).

Genetic studies

To further investigate the components of protein quantity and quality, Rohan selected winter wheat populations derived from a cross between two carefully selected contrasting parents:

Malacca (average grain protein content and low protein stability)

Hereward (high grain protein content and high protein stability)

The first population of 90 lines was already associated with a strong genetic map – a resource that can be used to pinpoint areas of the genome associated with any measured trait. He uses replicated field trials, in three environments, and measures grain quality components. The data will help him to develop 'breeder friendly' molecular markers to track grain quality genetics through breeding programmes.

The second population comprises near-isogenic lines (NILs). Each line features a limited number of known changes, with the rest of the genetic background the same (across all lines). It provides a powerful way to test the specific effects of 'good' and 'poor' quality alleles and how they are influenced by the environment. Following a careful analysis of grain processing quality, he has already identified a chromosomal area associated with bread texture. Once again, genetic markers can be used to track stable high-quality alleles during plant breeding.

Concluding later this year, Rohan's results will move the industry one step closer to the varieties of tomorrow. Critically, AHDB's investment also delivers skills to the industry – it's the primary aim of the PhD studentship programme. In this case, the project will deliver a scientist with a strong understanding of genetic mapping, agronomy, and grain testing techniques.

For further information, search 'grain protein PhD' at ahdb.org.uk/research

For further information, contact:

Dhan Bhandari
AHDB Senior Cereal Product
Quality Scientist
dhan.bhandari@ahdb.org.uk

Conferences

Catch up with the latest thinking...



Grain Market Outlook

22 November, Lincolnshire

Join us for insight into the potential direction of domestic grain and rapeseed prices.

Agronomists' Conference

6 December, online

Discover the latest evidence-based agronomy for the whole rotation.



© Alan Bennett

**FREE
TO
ATTEND**

ahdb.org.uk/events

ANIMAL FEED:

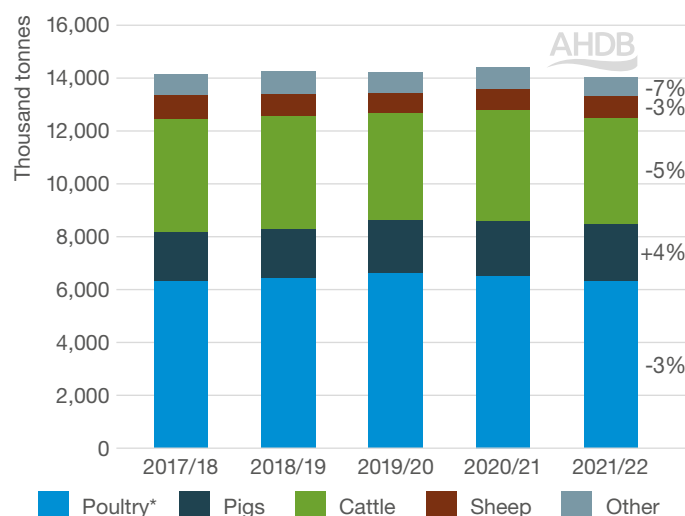
what's the demand for domestic cereals?

Multiple pressures on the GB livestock sector may dampen demand for feed grain this season. Megan Hesketh looks at the evidence.



As the single biggest use for feed grains, animal feed demand is extremely important to domestic cereals use. In the last full season (2021/22), GB animal feed production (including integrated poultry units) was 13,991 Kt. It was the lowest level since 2016/17, according to cereal usage statistics published by the AHDB.

The drop in demand is due to a fall in production of poultry, cattle and, to a lesser extent, sheep feed. It outweighs a rise in pig feed production in the same period. The increase in feed costs and energy costs has squeezed livestock margins. Pig feed demand saw rises because of a 'backlog' of pigs to be slaughtered, due to a labour shortage.



Source: AHDB, Defra.

Figure 1. Animal feed production volumes in Great Britain over a five-year period*

*Includes integrated poultry units.

Margin pressure is expected to continue this season (2022/23), especially in the pig and poultry sectors, bringing a further decline in animal feed production.

Data from the first month of this season (July 2022) showed a reduction in total animal feed production (including integrated poultry units) of 7.6% compared to the equivalent period last year (July 2021).

The pause of ammonia production at the CF Industries Billingham plant (announced in August) may impact domestic CO₂ availability and slaughter capacity for pigs and poultry.

With squeezed margins, AHDB UK sow herd estimates for the remainder of 2022 remain low (350K head). The rising cost of living for consumers is expected to curb demand too. In the latest AHDB pork outlook, UK pig meat production is expected to be down 6% on the year in 2022 and a further 9% in 2023.

Poultry margins are similarly being squeezed, with rising costs in the laying sector, specifically, not being met by prices paid by retailers. Demand is expected to be subdued for ruminants too. In dairy, despite higher milk prices, rising input costs (including fertiliser) and labour shortages are discouraging yield growth or herd expansion. 2022/23 GB milk production is forecast to finish 1.0–3.8% lower year-on-year. Ultimately, how low depends on the severity of cash flow pressures. Though beef and lamb throughputs are expected to be slightly stronger on the year.

Forage availability is particularly significant this season. Over the summer, drier weather (in many areas) led to little grass growth. This could see producers turn to substitute feeding of compounds and blends.

Which grains will be used?

The speedy harvest and higher end-of-June stocks have brought a plentiful supply of feed wheat at the start of this season. Lower protein in some domestic milling wheat may also add to feed supply. We can expect wheat to remain dominant in the ration this season. This contrasts with a continued tight domestic outlook for barley. The discount of feed barley to feed wheat is something to watch. As of 8 September 2022, the discount stood at c. £20.00/t (UK average, ex-farm).

Hot and dry US and EU weather is supporting maize markets, making maize less price competitive. Some carry-over may occur from last season into the first few months of this season.

Price direction impacts

Domestic supply is now in the shed for another year, but how much domestic demand we can expect is something to watch. With pressure on livestock margins, the demand for animal feed is expected to ease year-on-year. Rising inflation and recessionary concerns in the UK will also be critical to other areas of domestic demand, including the flour milling and the brewing, malting and distilling sectors. In Scotland, new distilling capacity is coming online, as well as oat milk (Oatly) production facilities. This will boost demand for grains. Additionally, it is expected that the two major UK bioethanol plants will be fully operational in 2022/23, something to consider for wheat demand, especially with maize prices supported.

In the context of the global market, feed grain prices currently remain supported. Although a looming recession presents concerns for domestic cereal demand, weakened pound sterling (from recessionary concerns) means GB exports are likely to look more competitive on the global market.

GRAIN MARKET OUTLOOK CONFERENCE

22 November 2022, Lincolnshire.
ahdb.org.uk/events

For further information, contact:

Megan Hesketh

Market Intelligence Senior Analyst (Cereals & Oilseeds)
megan.hesketh@ahdb.org.uk

Raising the profile of **UK GRAIN IN MOROCCO**

AHDB aims to keep UK cereals on the shopping lists of the country's milling and feed compounding companies. Dorit Cohen, Exports Marketing Manager, explains how.



When it comes to global trade, it is important to visit target markets to understand customer requirements, identify opportunities and nurture relationships with key decision makers.

Recently, members of the AHDB Exports team went on a mission to Morocco to promote grain from UK wheat and barley crops.

A tough year

2022 is a tough year for Moroccan farmers, their supply chain and government, as the country is experiencing its worst drought in 30 years.

The contrast with 2021 could not be starker. In 2021, cereal production reached record highs (10.3 million tonnes). This year, cereal harvest statistics peg the country's production at three million tonnes. The federation that represents Moroccan millers estimates that up to 70% of the harvest has been lost, triggering a heavy import campaign in volume and value.

Recently, France has topped the list of suppliers to Morocco. This is set to continue, with the country forecast to supply at least half of Morocco's estimated seven million tonne wheat import demand. Traditionally, Ukraine and Russia have satisfied around 35% of the Moroccan wheat import requirements. However, the war continues to disrupt the flow of grain from these territories, and this creates opportunities in the global marketplace.

Biscuit wheats

Morocco's biscuit market is particularly interesting. The country's soils are generally unsuitable for biscuit-wheat production. This creates an annual demand for biscuit-wheat imports, which are currently 80,000 tonnes and growing.

The growth is linked to a change in the diet of Moroccans, which is becoming more westernised and includes a taste for European-style biscuits. In response, biscuit factories are popping up across the country and they export their products across Sub-Saharan Africa.

This presents both an opportunity and a challenge for UK growers. Developed by AHDB, the UK's soft biscuit-grade wheat (**uks**) is widely known in the Moroccan market, even among millers who have not used it. It has a good reputation for producing Moroccan biscuits that no other origin can match. Its unique quality characteristics mean no additives or improvers are required for **uks** flour. As a result, demand for **uks** wheat is strong. It is often favoured over French or Canadian biscuit wheat. American biscuit-grade (soft red winter) wheat is not viewed as a competitor due to high freight costs.

So, what's the issue? Well, the challenge is clearly not associated with demand for UK grain. The 2022 AHDB Planting and Variety Survey results reveal the nub of the problem.

UKFM Group 3 wheats are at the heart of the biscuit-making grade. However, the wheat area dedicated to varieties in this group is far lower than any other flour group. This contributes to a supply tightness, causing challenges for both export and UK markets. Restricted supply can result in relatively high prices compared to soft wheats from other export origins.

Feed barley

In addition to animal feed, barley is used for human consumption, especially in southern Morocco. Each year, up to 100,000 tonnes are used to produce Moroccan soups that are rich in fibre and low in gluten. This season, Morocco is expected to import all its barley – up to a million tonnes.

Until recently, Ukraine and Russia had competitive prices and supplied most of the barley imported into Morocco. Now France and the UK supply barley to help fill the gap created by the ongoing war.

In August, the first grain shipments were dispatched from a Ukrainian port since Russia's invasion. However, significant disruption to trade flows is anticipated for many months. The Exports team will continue to engage with the Moroccan Millers Federation and buyers to keep opportunities open for UK grain.

To learn more about the team's activity, visit ahdb.org.uk/cereal-exports

UK consumers take the biscuit too

Since the removal of COVID-19 restrictions, UK consumer behaviour has returned to more familiar patterns. However, demand has not returned to pre-pandemic levels. For example, there has been a boost in the number of occasions people consume food and drink in the home, partly associated with daytime snacking. In mid-May 2022, this uptick in consumption was around 6%, compared to the same twelve-week period in 2019. This figure equates to an extra one billion home-consumption occasions, providing clear opportunities for retail sales. For example, biscuit purchases saw a 5% increase in retail volume sales from mid-June 2022 compared to the same period in 2019 (UK consumption data source: Kantar).

Other cereal-based products did not fare so well. Until recently, products, such as bread and breakfast cereals, were experiencing year-on-year increases. They have since moved into decline.

With the typical consumer poised to cut back spending in efforts to ride out tough economic times, it is likely they will turn to smaller, less costly, less healthy treats – this could provide further support for this biscuit market.

BISCUIT OPPORTUNITIES

When planning crop rotations, ask grain buyers about the opportunities that a biscuit-wheat variety could deliver to your business.

For further information, contact:

Dorit Cohen
AHDB Exports Marketing Manager
dorit.cohen@ahdb.org.uk

Over the hedge

News from across AHDB

Food – a fact of life

Children are the consumers of tomorrow and critical for the long-term sustainability of the UK food and farming industry. AHDB partners with the British Nutrition Foundation to deliver the 'Food – a fact of life' programme. Designed for teachers, it provides curriculum-relevant resources (3- to 16-year-olds) designed to increase children's understanding of where and how their food is grown, reared, and produced. The programme also encourages cooking and healthy eating.

ahdb.org.uk/education

Iron Awareness

Experts warn that reducing meat or dairy could lead to consumers lacking key nutrients, such as iron and B12. We Eat Balanced, an AHDB-led consumer campaign, aims to promote the health, sustainability and welfare benefits of consuming meat and dairy produced in Britain. Recent activity included striking photography of NHS doctor and author Emily MacDonagh in which her body was painted to appear as if she were made from iron. The campaign is particularly important due to cost-of-living concerns.

ahdb.org.uk/WeEatBalanced

Trade with New Zealand

Earlier this year, the UK and New Zealand signed a free trade agreement (FTA). It is the second major FTA to be agreed post-EU exit (the first being with Australia in 2021). In a series of online articles and webinars, the AHDB Market Intelligence team has explored the potential impact on UK agriculture of the latest FTA. The resources, which aim to answer the questions on the minds of UK producers, consumers, and agri-food stakeholders, are based on evidence-based analysis and quantitative economic modelling.

ahdb.org.uk/trade-and-policy

Beefing up the rotation

There are many benefits of integrating beef cattle into arable rotations, such as increasing soil organic matter. It also aids the introduction of grass, clover, and multispecies leys. A cost-benefit analysis of the approach (from AHDB Beef & Lamb) showed a positive net margin of around £250/ha (before rent and finance). By entering the land into a subsidy or stewardship agreement, and by accounting for the increased yields from the following arable crop, this margin can be improved. The AHDB Beef cattle in the arable rotation costings calculator can reveal the potential financial benefits of beef to your business.

ahdb.org.uk/tools

Top recruitment tips

The steps needed to recruit, train, motivate and develop staff were discussed at an AHDB-led forum at this year's British Pig and Poultry Fair. The forum highlighted the need to have strict recruitment processes and competitive remuneration packages. It demonstrated that how a farm business presents itself affects its ability to attract staff, even when it is not actively recruiting. Business owners were also encouraged to understand what makes each employee tick. The discussions were part of the AHDB's Skills Programme, which aims to make the uptake of business and leadership skills routine in agricultural businesses.

ahdb.org.uk/skills

Get closer to **FARM EXCELLENCE**



Ana Reynolds provides an overview of the Farm Excellence platform, and how to get involved.

Wherever you are in the UK, you will never be far from one of our Monitor Farms, Strategic Farms, Arable Business Groups, or your regional Knowledge Exchange Manager.

We are here to highlight practical on-farm solutions, stimulate discussion, connect you to expertise and information, and advance our collective needs.

Twenty Monitor Farms

Farmer-led and farmer-driven, the Monitor Farm network consists of working farms and communities committed to sharing information, ideas and best practice. Meetings, which focus on a topic or issue and are supported by industry experts, are open for anyone to attend.

We know from our annual survey that these meetings help people improve on-farm decision-making. We are excited about developing and evolving the programme further to ensure that as many farmers as possible can benefit.

Four Strategic Farms

Hosting and demonstrating practical research in a commercial farm setting, each Strategic Farm runs for six years. Results are shared throughout the year, with a flurry of activity during summer open days and November webinars.

Forty seven Arable Business Groups

Financial and technical benchmarking, setting goals and budgets, controlling costs and focusing on detail are all characteristics of top performing farms*. Arable Business Groups address all these characteristics, either anonymously or openly within the group. To locate a group or start your own, get in touch with one of our regional contacts.

*Source: Horizon report: Preparing for change.

“Farms with more information make more money.”

Further information

Use the map on the back page of this edition of Arable Focus to locate your nearest farm and regional contact.

ahdb.org.uk/monitor-farms

ahdb.org.uk/strategic-cereal-farms

ahdb.org.uk/arable-business-groups

Content on demand

If you can't make it to one of our meetings, we regularly publish information digitally, via our website, eshots, webinars and podcasts.

Can you host discussion groups and trials on your farm?

We are looking for hosts to join our programme from spring 2023. To apply, contact your regional contact (see back page).

Dates for your diary

Strategic Farm Results Month

Register and tune in from 12:30pm on Wednesdays throughout November 2022.

ahdb.org.uk/events

BASIS and NRoSO points are available at most Farm Excellence events.

For further information, contact:

Ana Reynolds

Head of Engagement (Cereals & Oilseeds)

ana.reynolds@ahdb.org.uk



TO GRAZE OR NOT TO GRAZE

Adrian James and Philip Dolbear examine on-farm trials that incorporate sheep within arable rotations.



Winter wheat

Alex Robertson* drilled Barrell winter wheat on 1 September 2021, with three 1.4 ha blocks fenced off. In late December, store lambs (78) grazed the first block for three days, subsequently moving on to the next block for four days. The third block was left as an ungrazed control. The grazing approach was the only difference between the blocks. Harvested on 12 August 2022, the yield differences were minimal: three-day block (8.78 t/ha), four-day block (9 t/ha) and control block (8.98 t/ha). The biggest benefit was gaining extra grazing with the lambs. They performed well on the wheat and were all sold fat.

Cheltenham monitor farmer Andrew Walters grazed second winter wheat (Crusoe) with lambs (50) in a 4-ha field (drilled on 4 October 2021). The sheep grazed the forward and lush crop from the end of January, spending one week in each of the four blocks. Although the crop was grazed close to the ground (helping to remove early mildew), it did green up again. The wheat received 215 kg of nitrogen and a liquid fertiliser to help boost protein. No T0 was required, with copper, boron and manganese applied after tissue testing. At T1, sulphur was applied to hold back powdery mildew. The programme also included benzovindiflupyr and prothioconazole (T2), and tebuconazole and prothioconazole (T3). The final yield (10.2 t/ha) was above the farm average, although the straw yield was lower.

Oilseed rape

Graham Innes* wanted to reduce spring applications of plant growth regulators (PGRs) to his oilseed rape. In late November 2021, sheep (191) grazed 3 ha of Acacia oilseed rape for nine days. The field received the same amount of fertiliser as his other oilseed rape, but he cut out the PGRs. At harvest, the grazed crop was visibly shorter than the ungrazed crop, yielding (on average) 4.8 t/ha. However, the middle of the field averaged 6 t/ha. With hindsight, Graham felt that introducing the sheep earlier would have been beneficial, as the crop's growth was extremely forward.

Next steps

The initial results from these trials have boosted the confidence of the farmers. They plan to continue to investigate and refine the approach this year.

*Graham and Alex are in the AHDB Arable Business Group (ABG) in the Scottish Borders.

Further information

Download our guidance today:
ahdb.org.uk/livestock-and-the-arable-rotation

Dates for your diary

Monitor Farm meetings

Salisbury: The Environmental Farmers Group (3 November 2022)

Cheltenham: Labour, power and machinery (8 November 2022)

Saltash: Making the most of social media in farming (10 November 2022)

ahdb.org.uk/events

For further information, contact:

Adrian James

Knowledge Exchange Manager
(Scotland)
adrian.james@ahdb.org.uk

Philip Dolbear

Knowledge Exchange Manager
(South West)
philip.dolbear@ahdb.org.uk



© Amy Bateman photography

Flowering habitats for pest control

A series of on-farm trials is using flowering strips to influence the abundance, behaviour, and diversity of beneficial insects. Isobel Eames spoke with one farmer involved.



© Jon Oakley

Based in Esrcick, North Yorkshire, Angus Gowthorpe has 400 acres of arable and grassland, which has been in a regenerative system for several years. He does not use insecticides on the farm and wants to exploit biodiversity to help keep crop pests in check.

After seeing the potential of other field labs, he approached Innovative Farmers (innovativefarmers.org) with an idea. Angus wanted to determine whether in-field strips were necessary or whether flowering margins would allow beneficial insects to travel far enough into his fields.

As the topic aligned with Innovative Farmers' mission to help farmers become more profitable and sustainable, the group secured AHDB-funded support for a field lab. In addition, to help with the finances, the farmer group (seven farmers based in the north east of England) was put in touch with entomologists from ADAS, Newcastle University and Cawood Scientific to help design the trials and analyse the results.

The simple protocol covered key trial variables, such as establishment technique, margin age and species mixture. It also took account of the various farming systems operated by the group – conventional, organic, and regenerative – and was flexible to fit around the farms' other activities. Finally, it featured a control, a field with no flowering strip or margin, and detailed how to collect insects via a series of pitfall and sticky traps.

The report is due out later in 2022. This year, however, margin establishment wasn't straightforward. When asked if he would do anything differently, Angus said: "Next year, I plan to drill at the end of May, when there is more warmth in the soil." However, he plans to stick with direct drill establishment, "When wildflowers seed themselves, they drop onto the ground. There is no need to cultivate unless there is a thick sward."

Angus encourages those considering trialling the approach to 'start simple' by placing yogurt pots in fields to trap the beneficial insects present. This will provide a baseline from which to assess the impact of contrasting practices.

Further information

For details about this project, which includes a video, visit: ahdb.org.uk/innovative-farmers-field-labs

Download the AHDB Encyclopaedia of pests and natural enemies in field crops: ahdb.org.uk/pests

Dates for your diary

Strategic Cereal Farm meeting

East: Flowering strip trial results webinar (16 November 2022)

ahdb.org.uk/events

For further information, contact:

Isobel Eames
Knowledge Exchange Manager
(North East)
Isobel.eames@ahdb.org.uk



Is **regenerative agriculture** good long-term husbandry?

Harry Henderson digs into the world of regenerative agriculture and considers whether it is just a fashionable term.



Quinoa. Do you think of it as a potential break crop on your farm (these protein-packed seeds could provide a viable home-grown alternative to rice) or as something you add to a meal to impress friends. Is it a fad or a staple ingredient in balanced diet?

In a way, it's like regenerative agriculture. Is it new and something to adopt as soon as possible or is it simply good husbandry, which many are already doing – with 'only as much as necessary' being the guiding principle? What do you think?

Your attitude to regenerative agriculture may reflect your attitude to risk, including your approach to yield. Recently, AHDB used Farmbench data to answer a key question: 'Is yield king?' Well, the answer is always 'no', not at any cost. Gross margin is always king.

Favourable growing conditions are the key to good yields. Even more important than the application of products. However, as good growing conditions are never guaranteed, risk-management approaches must be adopted on the farm.

Do you mitigate risk with fresh machinery, full crop protection programs and short rotations, and rely on achieving high yields from the most profitable crops? Or do you deal with risk by managing your soil to cope with weather extremes, reducing cultivations, and lengthening your machinery's life? And, by doing so, increasing soil organic matter, reducing compaction, lessening resistance to making a seedbed, and encouraging more surface cycling of plant material into crop-available nutrients?

By adjusting the farm to suit and manage input costs, weather impacts and price volatility, you've already gone a long way to setting up the farm for the long term and, 'yes', regenerating your greatest asset: your land.

So, perhaps regenerative agriculture isn't just a fashionable term. It certainly isn't completely new. In fact, the adoption of one or more of these five long-standing points will improve the resilience of your business in increasingly turbulent times:

- Manage drainage – review, maintain, repair or replace drainage systems (ahdb.org.uk/drainage)
- Review soil management – assess the need and justification for soil movement (ahdb.org.uk/arable-soils)
- Make integrated pest management work – get it to pay dividends and not become extra workload (ahdb.org.uk/ipm)
- Investigate cover crops – there are clear benefits in building soil structure, soil moisture management, soil nutrient availability and ground cover (ahdb.org.uk/cover-crops)
- Benchmark – understand your income and outgoings, and plan for your farm (ahdb.org.uk/farmbench)

Dates for your diary

Monitor Farm meetings

Buckinghamshire and Bedfordshire:
Regenerative agriculture
(16 November 2022)

Hale Village: Regen book club
(16 February 2023)

Penrith: Regenerative agriculture
(21 February 2023)

ahdb.org.uk/events

For further information, contact:

Harry Henderson
Knowledge Exchange Manager (National)
harry.henderson@ahdb.org.uk

Cultivation and establishment costs

Downpatrick Monitor Farm has investigated the costs of contrasting cultivation and establishment strategies. Michelle Nuttall looks at the results.



Downpatrick monitor farmer Richard Orr set up cultivation trials to compare the costs of four drills in plots that had been direct drilled, cultivated, or ploughed.

The trials ran for four years (2019–22) across the rotation (winter wheat, winter barley, spring barley and winter wheat), with data captured on yield, soil (health, moisture and temperature), weeds, plant populations and grain nutrients.

Although the on-farm trial was not replicated and the results not scientifically analysed, the findings were enlightening.

The cost of establishment ranged from around £30–£50 for the direct-drilled plots to around £70–£90 in the ploughed plots (see Table 1). The average yields across all crops and years for the cultivated (9.49 t/ha) and ploughed (9.40 t/ha) treatments finished ahead of the direct-drilled treatment (7.88 t/ha).

In the first season, the direct-drilled plots had extremely high weed burdens. However, levels dramatically reduced across the rotation. At the end of the trial, the direct-drilled plots had similar weed levels to the other plots.

Richard found that the min-tilled land was more travelable, with clear evidence of improved soil health. During the summer 2022 meeting (the final one for this Monitor Farm), clear differences in infiltration rates were demonstrated. The direct-drilled plots (which also had more worms) absorbed two litres of water over three times faster than the ploughed areas:

- Ploughed and Kuhn combination drill plot: 7 min 13 sec
- Direct drilled (Claydon tine drill) plot: 2 min 5 sec

Drilling dates were another learning point. Richard said: “In direct-drill situations, I need to drill at least a week earlier to help the crop establish well.”

The trial acted as an icebreaker in the Monitor Farm group, with the plots sparking many questions and encouraging people to try something new.

Dates for your diary

Upcoming Monitor Farm meetings on soil health and cultivations

Loppington (11 November 2022)

Cambridge (9 November 2022)

Ripon (1 December 2022)

Vale of Glamorgan (9 November 2022)

ahdb.org.uk/events

For further information, contact:

Michelle Nuttall
Knowledge Exchange Manager
(North West)
michelle.nuttall@ahdb.org.uk

Table 1. Cost of establishment (based on three trial years, 2019–21)

Totals*	Horsch disc drill	Claydon tine drill	Kuhn combination	SimTech
Direct drilled	£36.31	£48.72	£48.42	£29.71
Cultivated**	£63.41	£75.82	£75.52	£56.81
Ploughed***	£76.10	£88.51	£88.21	£69.50

*All totals include rolling costs (£3.60)

**All cultivated totals include cultivation costs (Kverneland, £27.10)

***All ploughed totals include plough costs (Kverneland, £39.79)

Note: The trial design resulted in some non-standard drill/cultivation combinations. For completeness, results for all combinations are presented in the table.



Will **winter wheat blends** win?

Four Hereford Monitor Farm members are growing a blend of wheat varieties to help tackle disease. Philip Dolbear investigates.

For the second year running, on-farm trials in the west of England have evaluated the potential of growing a blend of winter wheat varieties.

Rob Beaumont, Adam Lewis, Martin Carr and Jack Hopkins' mission is to diversify the disease ratings in the crop. The intention is to make it more resilient to the dominant diseases in the region.

It is hoped that the approach will provide extra flexibility and insurance. Characteristics that are in demand in the wetter west. The fickle weather is a challenge to predict. In some seasons, it is not easy to find a suitable spray day. The blended approach could help reduce disease pressure and provide wider spray windows.

More complex mixtures – with several disease resistance profiles – are more likely to result in a greater disease reduction. A mixture of at least three varieties is best. In both years (harvest 2021 and 2022), the same four-way blend was trialled, comprising:

- KWS Extase – UKFM Group 2*
- LG Skyscraper – Soft Group 4*
- Graham – Hard Group 4*
- Gleam – Hard Group 4*

Widely grown in the area, the varieties were selected based on their disease resistance, yield, quality, and maturity.

The AHDB variety blend tool (ahdb.org.uk/variety-blend-tool-for-winter-wheat) reveals that the four varieties differ in their ancestry, achieving a parental diversity score of 0.97 (1 indicates that varieties share no recent ancestors and are likely to be based on broader genetics).

Comparisons between the blended crop and a variety standard (in another part of the field), will help determine whether the strategy paid off.

Adam Lewis, Hereford Monitor Farm host, said: "A single variety doesn't necessarily have all the answers. This trial is about firing the imagination. If you have a field of blended varieties, they might be able to bring a characteristic to the party that the others don't have. Farming isn't about producing the biggest crop, it's about spreading the risk. I hope to end up with a blend that's genetically suited to my field."

The repeat of the trial will help ensure consistency of results, with the full results available at an upcoming Hereford Monitor Farm meeting.

*Based on the AHDB Recommended Lists for cereals and oilseeds 2022/23.



For further information, contact:

Philip Dolbear
Knowledge Exchange Manager
(South West)
philip.dolbear@ahdb.org.uk

Note: It is important to consider the quality implications of each mix and the requirements of grain buyers.



© Liz Bishop Photography

MONITOR FARM TESTS LIVING MULCHES

By establishing a living mulch in his combinable crops, monitor farmer Rob Waterson hopes to increase the resilience of his system. Hannah Bowden explains.



Rob is the farm manager for the Welford Park Estate. It features several hundred hectares of arable land and is the home of the Newbury Monitor Farm.

He strives to move towards systems that are more viable and sustainable. On this journey, Rob pinned high hopes on living mulches and their potential to support and protect the main cash crop.

The potential benefits of the approach have been widely reported, such as improvements to soil organisms, nutrient availability, weed suppression and erosion control. The creation of a consistent green cover can also help protect the soil from weather extremes, from dry periods to floods. Rob wanted to assess the benefits to his own land and understand the costs.

Although research shows that the technique is sometimes associated with a cash-crop yield penalty, Rob did not observe a notable yield reduction in the crops tested (wheat, oats and beans), when grown alongside a clover mulch.

Of the mulch species trialled, the strongest result was associated with a clover and mustard mix in a 2021-sown crop of beans. However, the beans were not the main beneficiary. In fact, wet weather caused the beans to suffer and the clover to boom. Ultimately, the rampant clover helped increase soil stability, resulting in the subsequent wheat crop being a “joy to drill”.

With the living mulch advanced, Rob lightly sprayed it with herbicide prior to drilling the wheat. This action helped reduce canopy competition from the mulch and promoted nitrogen release into the soil. However, as is often the case in farming, an effective crystal ball would have come in handy. Following the spray, a period of drought hit, killing most of the clover.

It is fair to say that Rob has witnessed the ups and downs of living mulches. He said: “The idea behind them is fantastic, but establishment and persistence challenging.”

So far, the trials have produced benefits, with the mulches promoting some healthy root systems and better general soil health. He is determined to overcome the establishment and maintenance difficulties by testing new methods and mixes.

Further information

If you would like to learn about Rob's experiences with living mulches or contribute to the debate, consider attending a Newbury Monitor Farm event: ahdb.org.uk/farm-excellence/newbury

Find out about the AHDB-sponsored Innovative Farmers living mulches field lab, visit ahdb.org.uk/innovative-farmers-field-labs

Dates for your diary

Monitor Farm events

Chathill: crop nutrition and living mulches (1 November 2022)

Limavady: nutrient management (17 November 2022)

Vale of Belvoir: crop nutrition (8 December 2022)

ahdb.org.uk/events

For further information, contact:

Hannah Bowden

Knowledge Exchange Manager (South East)

hannah.bowden@ahdb.org.uk



Spring Barley, Undersown
with Biostimulant

DIRTY LAUNDRY AIRED?

Tough topics tackled at Monitor Farms

Matthew Brearley spoke with monitor farmers about how they are approaching the Sustainable Farming Incentive (SFI) and testing biostimulants.



© AHDB

In farming, change is the only constant. Farm support is a classic example. Even the term Agricultural Transition Plan implies movement from one situation to another. We spoke with some of our monitor farmers about their experiences with the SFI.

SFI concerns

A common concern is that the SFI is relatively complex with a diluted financial incentive compared to what was on offer in the SFI pilot. To be introduced in England first, the SFI is evolving to meet the diverse interests of multiple stakeholder groups, so the forces of negotiation and compromise were always going to affect the outcome.

The spirit of the scheme remains welcome, with its aim to improve food production in a more environmentally sustainable way, with actions that improve soil health at the top of the incentive list. However, soil health is a fickle beast. Certainly, it is hard to tame with one-size-fits-all measures. Our Monitor Farmers want to make the right choices for food production and the environment. They do not want to tick boxes.

Jonathan Fryatt (Ripon Monitor Farm) and Matt Redman (Cambridge Monitor Farm) are assessing winter cover crop options in the scheme and how to incorporate them. The inclusion of a multi-species green cover on at least 20% of the land (intermediate level standard) provides one of the biggest debates, including how success will be measured.

Identifying the best species mix requires an understanding of the impact of each species on the sequenced cash crops. With cabbage stem flea beetle present on his farm, Jonathan wants to avoid green bridges that build pest pressure. Working heavy land, he prefers to use cover crops opportunistically, flexing the approach in response to conditions. The dictat that cover crops must be included reduces adaptability in his system, which is likely to affect his farm disproportionately compared to many others. As a tenant farmer, Matt Redman has extra pressures. He needs to consider whether he will have the same land available for the duration of the scheme.

Mixed farmer Ashley Jones (Saltash Monitor Farm) saw an opportunity to add income out of the permanent grassland on his farm, with little to lose by entering the scheme in some capacity. However, he is looking at the costs of the assessments required (at all levels of the standards). Soil organic matter (SOM) tests need to have been conducted in the last five years. This largely echoes best practice within AHDB guidance. However, all components need to be weighed up carefully. Once again, the variable nature of soils means some farms need to place greater emphasis on sampling if a robust picture of SOM is to be captured. Ashley is considering whether the best revenue-generation option would be to continue with the Countryside Stewardship Scheme already in place on the farm and diversify the enterprise.

The Monitor Farm network allows farmers to discuss a wide variety of business challenges, including the SFI.

ahdb.org.uk/sustainable-farming-incentive

Biostimulants banter

In the UK, a diverse range of biostimulants is available. These are grouped as either 'microbial' or 'non-microbial' and can be further classified by product type. They claim to stimulate natural plant processes, potentially making crops more efficient – by promoting plant nutrition, enhancing stress tolerance and improving growth.

In 2016, AHDB reviewed the mode of action, efficacy and value of commercially available biostimulant products. In many biostimulants, there was little evidence of strong benefits in UK conditions. A lack of independent testing has put many off using them. However, some monitor farmers are testing products in on-farm trials.

For example, James Parker and his son Michael (Vale of Belvoir Monitor Farm) have tested whether biostimulants have a place in the crop nutrition programme,

with tissue tests used to inform the treatment plan. Their experience shows that biostimulants are most likely to offer peace of mind when crops are stressed. The challenge is to predict when the next stress event will occur.

In trials on a second wheat crop, Gary Shipley (Huggate Monitor Farm) found N-tester recommendations showed that the two biostimulants tested provided as much nitrogen to the crop as standard farm practices – with ear counts comparable between treatments. He is using Farmbench to assess the impact of the approaches on the overall cost of production. He also plans to get grain samples analysed to assess the nutritional impact.

Because of the biological nature of biostimulants, trials are often inconclusive. There is a hunger for independent testing, but such research would be complex and expensive. However, the Monitor Farm network allows farmers to pool experiences and, collectively, make better business decisions.

ahdb.org.uk/biostimulants

The images show how buried cotton underwear degraded in the presence of a biostimulant at Morayshire Monitor Farm.

For further information, contact:

Matthew Brearley
Knowledge Transfer Officer (National)
matthew.brearley@ahdb.org.uk



Introducing your Farm Excellence team

- | | |
|---|---|
| 1 Scotland
David Aglen | 13 East
Brian Barker |
| 2 Chathill
Pip Robson | 14 Cambridge
Matt Redman |
| 3 Penrith
James Turner and
Henry Scholefield | 15 Buckinghamshire
& Bedfordshire
Will MacLennan |
| 4 Ripon
Jonathan Fryatt | 16 Hereford
Jack Hopkins,
Rob Beaumont,
Martin Carr and
Adam Lewis |
| 5 North
David Blacker | 17 Cheltenham
Andrew Walters |
| 6 Huggate
Gary Shipley | 18 Vale of Glamorgan
Dan Moore |
| 7 Hale Village
Bill Webb | 19 Newbury
Robert Waterston |
| 8 Loppington
Rory Lay | 20 South
David Miller |
| 9 Wainfleet
Gary and Debbie
Willoughby | 21 Salisbury
Ben Jeans |
| 10 Vale of Belvoir
James and
Michael Parker | 22 Saltash
Ashley Jones |
| 11 Wisbech
Andrew and
Sam Melton | 23 Thame
Garth Weston |
| 12 Diss
Richard Ling | 24 Limavady
Alistair Craig |

 **Monitor Farm**

 **Strategic Farm**



Your Regional Team

Scotland
Adrian James
adrian.james@ahdb.org.uk

**North West and
Northern Ireland**
Michelle Nuttall
michelle.nuttall@ahdb.org.uk

North East
Isobel Eames
isobel.eames@ahdb.org.uk

East Midlands
Judith Stafford
judith.stafford@ahdb.org.uk

West Midlands and Wales
Philip Dolbear
philip.dolbear@ahdb.org.uk

East Anglia
Amy Catling
amy.catling@ahdb.org.uk

South East
Hannah Bowden
hannah.bowden@ahdb.org.uk

South West
Philip Dolbear
philip.dolbear@ahdb.org.uk

National
Harry Henderson
harry.henderson@ahdb.org.uk

Fiona Geary
fiona.geary@ahdb.org.uk

Matthew Brearley
matthew.brearley@ahdb.org.uk

Head of Engagement
Ana Reynolds
ana.reynolds@ahdb.org.uk

Would you like to join the Farm Excellence network?

Application deadline: 10 February 2023