Grain OUTLOOK THE JOURNAL FOR CEREALS & OILSEEDS



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Autumn/Winter 19

HE RISE OF THE LOW-CARB DIET

It's one of the key health trends seen in the consumer world, but how does it affect bread and flour sales?

IS YIELD KING?

Theoretically, very high yields are possible, but do they pay off?

P-OWERED UP FOR RB209 FOR 2020

A revision of the Nutrient management guide features the first major changes to phosphorus guidance in nearly four decades

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LETTER FROM THE EDITOR



ELEANOR HOLDSWORTH EDITOR

Six years ago, the world saw the election of a new Pope; the widest tornado ever recorded on earth; Edward Snowden and the Wikileaks; Egypt's military coup; and the launch of India's unmanned Mars Orbiter. Six years ago, we also launched the AHDB Monitor Farm programme in England, Wales and Northern Ireland (it had already been running successfully in Scotland).

Since that time, thousands of people have been involved in Monitor Farms; we've funded reams of research; our market specialists have pored through piles of information and we've served countless cups of tea. The Monitor Farm programme has been a brilliant way for us as AHDB people to meet you and for you to tell us how things really are.

How will the industry look back on 2019? Only time will tell. But it's our mission to help you face the future in the strongest position possible. As usual, read on for just a snapshot of the work we've done on your behalf. And do remember to get in touch, with any comments or ideas for future editions of Grain Outlook.

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VIEW FROM THE CHAIR

PAUL TEMPLE AHDB BOARD MEMBER SECTOR CHAIR FOR CEREALS & OILSEEDS

I recently met with a group of farmers gathered from all continents and I realised how similar many of our problems are: market prices, soil management and competing against other industries for workforce. Climate change might not be talked about in the same way but all the farmers recognised that the number of extreme weather events they face are growing in frequency. What was fascinating was the different approach to these problems and the role governments played.

There is huge variation across the continents as to what pesticides farmers have access to. The uptake and approach to genetics is widely different and the two combined lead to a huge variation in productivity. Water is often seen as the limiting factor and rarely is its use controlled or quality dictated, in a way the EU applies the Water Framework Directive.

There were some particularly telling lessons to be taken in the different management approaches and, as EU farmers, we were certainly seen as having it easy. Something we might dispute or qualify but it's a useful challenge.

Across the sectors, AHDB has tried, through the Brexit process, to bring constructive challenges for levy-payer benefit. The common thread behind success from that global group of farmers was the willingness to change and learn from each other. So it was rewarding to find that the AHDB Monitor Farm programme was something they all instantly recognised as being of real benefit. To all involved: keep up the great work. And to those who might not have been to a meeting: there has never been a more important time to share experiences in changing times, so give it a go this autumn.

NEWS IN BRIEF

NEW MONITOR FARM HOSTS NEEDED – WATCH THIS SPACE

We'll be looking for new Monitor Farm hosts in November. If you're interested, keep an eye on the AHDB website or get in touch with your local knowledge exchange manager to find out more.

CALLING COLLEGE LECTURERS

Our annual College Lecturer's Day is on 30 October. This is a chance for those working for colleges, universities and other further and higher education institutions to learn more about AHDB, our services and the publications we offer.

ahdb.org.uk/events

COLLABORATION FOR ARABLE RESEARCH

AHDB has struck a new partnership with the Foundation for Arable Research (FAR) in New Zealand, to share knowledge and resources that benefit arable growers on both sides of the globe.

RECOMMENDED VIEWING

Look out for the new Recommended Lists videos to find out more about how the RL works.

NEW LOOK

Over the summer, our digital teams have been working hard to improve the way we provide you with information online. You'll notice new-look market intelligence emails and you'll find all AHDB information in one place now:

ahdb.org.uk

MYTH-BUSTING

AHDB's Meat Advisory Panel (MAP) proactively and reactively communicates key health messages around red meat. The group of independent dietitians and health experts retained by AHDB promote positive messages.

Later in 2019, MAP will become the Food Advisory Board (FAB), to be the voice of science and evidence, against the noise of fad diets.

POTATO INDUSTRY TO HEAD TO HARROGATE FOR BP2019

The biannual potato industry exhibition, BP2019, returns to Harrogate on 20 and 21 November, where AHDB is organising a seminar programme aimed at helping the industry prepare for change.

ahdb.org.uk/potatoes

OPEN FARM SUNDAY

For the fifth year running, more than a quarter of a million people connected with farming on LEAF Open Farm Sunday. This year, 250,450 people went out onto 365 farms from Jersey to Shetland. One in five of those people were visiting a farm for the very first time.

The next Open Farm Sunday is on 7 June 2020.

FIVE NEW BEEF & LAMB STRATEGIC FARMS

Five sheep farms have joined the 2019 Strategic Farm programme: Neil Brown, New House Farm, Ludlow; Richard Carruthers, Rawfoot, Penrith; Adrian Coombe, Dupath Farm, Cornwall; Chris Elkington, The Brambles, Grantham; and Steven Lawson, South Farm, Newcastle Upon Tyne.

ahdb.org.uk/beef-lamb

BECOME A PANEL MEMBER

We're looking for new voices to help steer our work to make sure we're delivering value and impact for the horticulture sector. The election process for our crop sector panels is now open and we have 21 vacancies for progressive and inspiring growers. Members serve a three-year term that starts in January 2020. Visit **horticulture.ahdb.org.uk** to find out more and apply.

FREE MUCK PLACEMENT STICKER

No need to remember the rules about muck placement and water again. Pop this helpful sticker in your tractor cab and all the important information about minimum distances from different water types will always be available for whoever is moving the muck.

Order your stickers by emailing comms@ahdb.org.uk



DAIRY ON THE UP

More young parents are certain to buy dairy products – 11% to be exact – according to research carried out after the second year of AHDB and Dairy UK's marketing campaign. The study also showed an 8% fall in the number of people cutting their dairy consumption now or in the future, along with an 11% reduction in intentions to consume plant-based substitutes.

ahdb.org.uk/dairy



STUDENTS' UNION: TACTICS TO SLUG IT OUT

Jason Pole, AHDB Communications Manager

Targeted treatment of the most mollusc-riddled parts of a field is a step closer, thanks to an innovative research programme that tags and tracks grey field slug populations.

AHDB-funded PhD student Emily Forbes has been hot on the slime trail of these major crop pests for the past three years. Based at Harper Adams University (HAU), she uses radiofrequency identification (RFID) tag technology, originally developed to track cattle, to monitor slug movement in commercial fields and explore options for more precise control.

Emily said: "Slugs need to shelter from the sun; it's why they prefer to feed at night and shelter underground during the day. RFID tags reveal what slugs get up to, no matter where they hide."

The tags, which are about the size of a grain of rice, were injected into slugs. To make sure tagging did not change the slugs' behaviour, a laboratory experiment was set up to monitor their movements. Video tracking found that the slugs' routines did not change, compared with non-tagged slugs. This finding gave the green light for the approach to be used, to record natural slug activity in the field.

The PhD focused on the distribution of slugs across a field. In particular, Emily aimed to define what causes slug populations to develop in distinct patches. An RFID scanner, which operates in a similar way to a metal detector, was swept over the ground regularly to map the whereabouts of tagged slugs.

It turns out that grey field slugs are not particularly adventurous.

Over four nights of monitoring, on average, slugs travelled less than a metre and stuck to a defined 'home range'. Individuals also used slime trails, created by other slugs, to navigate around their patch.

Through precise monitoring of slug movements, Emily established that patches were able to form in relatively small areas, much smaller than originally anticipated. The use of mathematical models also found that patches were relatively stable over time, which opens up the potential for targeted treatment.

As the lowest-cost chemical option, metaldehyde-based slug pellets have dominated the molluscicide scene. It looked like this control option would be lost in 2020. However, in July, the High Court ruled that the planned withdrawal was unlawful. Although the products remain on the market, their authorisation is fragile. The industry needs to look more closely at other options, including ferric phosphate and biological control. As these options are associated with higher treatment costs, any information to help target treatment is in high demand.

AHDB invests about £1 million a year in doctoral research at UK universities, colleges and research institutes, as part of its work to develop a new tranche of agricultural and horticultural scientific expertise.

> PhD student Emily Forbes has studied slugs for the past three years

The same HAU research group also uses RFID tags to establish how slugs respond to specific treatments. Metaldehydetreated slugs tend to produce lots of slime and die on the soil surface. However, those treated with ferric phosphate stop producing slime, retreat underground and die a few days later.

The integrated pest management (IPM) of slugs can be investigated in far more detail, thanks to RFID tags. IPM options, which require further investigation, include the use of companion crops to provide a 'preferred' food source for slugs, the potential of less attractive/ more repellent crops, the role of slughunting beneficials and the influence of various cultivation techniques.

The studentship project, which is due to report later this year, has also improved understanding of the soil characteristics associated with patch formation. AHDB plans to invest in follow-up work to establish how soil maps can help with the precision application of slug treatments.

ahdb.org.uk/phd-studentships



SOIL HEALTH: LET'S GET **PHYSICAL** (CHEMICAL AND BIOLOGICAL)

Jason Pole, AHDB Communications Manager

If you want to know how healthy you are, there are a myriad of tests and tools to help you 'quantify' the condition of your body – your blood pressure, your body mass index and your cholesterol level, for example. Now there is a move to develop ways to quantify the health of your soil, too.

How to measure the physical, chemical and biological condition of soils has been the focus of the AHDB/BBRO soil biology and soil health partnership. The research has assessed the suitability of indicators and set threshold values for the most promising ones.

When measurements are entered into a prototype 'soil health scorecard' (currently, an Excel spreadsheet), a traffic-light system flags up whether anything requires investigation (red), monitoring (yellow) or, if things are good, where no action is needed (green).

A network of seven experimental sites has been set up to test the scorecard approach. The sites represent various soil management histories, soil types, soil organic matter additions, pH levels, drainage statuses/structures, climatic conditions and rotations (including grass leys, cereals, sugar beet and potato production).

One of these sites provides an extreme test for the scorecard. Established in 1991, on a sandy-loam soil ('Wick' soil series), the Harper Adams University site has had a long history of organic material additions in a predominantly arable rotation (cereals and potatoes). Five organic material treatments have been applied annually at recommended rates (see Table 1) and cumulative organic matter inputs range from 0 t/ha to 129 t/ha (Table 2).

In terms of soil organic matter (SOM), the thresholds set reflected the soil type and climate. Unsurprisingly, the control

 which received no applications of organic matter – had a relatively low SOM content. However, the light-textured soils responded well to organic materials, particularly the bulky materials, such as farmyard manure (FYM) and green compost.

Extractable phosphorus (P), potassium (K) and magnesium (Mg) levels were also measured, with thresholds based on AHDB Nutrient management guide (RB209) values. In the control, nutrient levels were relatively low. The soil is inherently high in extractable P, which was clear across all treatments, with the highest levels in the FYM treatment.

Visual Evaluation of Soil Structure (VESS) scores from the topsoil (top 30 cm) were healthy across all treatments. VESS is a straightforward and quick way to test soil structure in three simple steps – soil removal, soil assessment and soil scoring. Ideally, each distinct soil layer should be assessed separately and management focused on the worst-performing, 'limiting' layer. A score of 1 or 2 is good, a score of 3 is moderate and shows the soil requires monitoring, and a score of 4 and 5 indicates that management action is required.

Counts of the number of earthworms (total number of adults and juveniles) revealed that all treatments were associated with an active population – more than eight per 20 cm³ pit is an 'active' population for arable or ley/arable soils.

The application of bulky organic materials was also shown to improve topsoil bulk density (at 5–10 cm depth), from 1.4 g/cm³ on the control treatment to 1.3 g/cm³, where either FYM or green compost had been applied.

The scorecard approach is valuable because it breaks down soil health into its component parts. It can focus attention and guide management interventions to improve the overall health status of the soil.

During the remainder of the partnership, the scorecard will be refined and tested across the experimental sites, and in consultation with eight farmer research innovation groups.

The partnership project is also innovating in molecular biology to yield ways to measure the soil biological community, including the presence and distribution of soilborne pathogens. The group is also advancing understanding of how each component of soil health impacts on crop yield and quality.

Information on the project, including research case studies and reports, can be accessed via **ahdb.org.uk/greatsoils**

Project facts

Soil Biology and Soil Health Partnership January 2017 to December 2021 AHDB funding £858,869 BBRO funding £140,934 Total funding £999,803



Table 1. Organic material treatments applied at the Harper Adams University trial site

Treatment	Applications to autumn 2017	Organic matter loading (t/ha)
Control	None	0
Cattle FYM	23 years	129
Cattle slurry	23 years	53
Green compost	13 years	62
Green/food compost	7 years	27
Food-based digestate	9 years	7

Note: Manufactured fertiliser was applied across treatments to ensure that nutrient supply did not limit crop growth North East Scotland Arable and mixed systems with root crops

North West Sheep and beef grazing system

West Livestock, arable and field vegetable systems

> South West Dairy and mixed systems

Farmer research innovation groups have been established across the UK, to review the soil health scorecard approach.

North East England Arable and mixed systems

East Yorkshire Arable and mixed systems with root crops

East Midlands Arable and mixed systems

East Anglia Arable systems with root crops and field vegetables

Table 2. Example soil health scorecard for the Harper Adams University trial site

Attribute	Control	FYM (23 yrs)	Slurry (23 yrs)	Green compost (13 yrs)	Green/food compost (6 yrs)	Food-based digestate (9 yrs)
SOM (%)*	3.0	4.1	3.6	4.0	3.7	3.4
pH *	6.4	7.0	6.4	7.0	6.2	6.5
Ext. P (mg/l)*	56	73	53	60	59	65
Ext. K (mg/l)*	80	311	194	187	140	167
Ext. Mg (mg/l)*	44	87	75	63	66	48
VESS score	2	2	2	1	2	2
Earthworms (Number/20 cm ³ pit)	11	13	9	11	9	13
			Investigate	Monitor	No action neede	d

*Attributes that showed a statistically significant difference between treatments (P<0.05)

P-OWERED UP FOR RB209 FOR 2020

Jason Pole, AHDB Communications Manager



The 2020 revision of the AHDB Nutrient management guide (RB209) will feature the first major changes to phosphorus (P) guidance in nearly four decades.

Since 2009, AHDB has invested in a broad range of research activities to improve recommendations for this major nutrient. The pressure to reduce the amount of P that works its way to water bodies, as well as general concerns about the sustainability of P mining, means a healthy amount of public funds has helped to bolster this investment.

P philosophy is to 'feed the soil' to keep it at the target index – Index 2. P is applied to top up levels, in particular to replace the P removed in grain and straw. However, with about 80% of UK arable land estimated to be at or above Index 2, many strategies use 'P holidays' to run levels down.

• The core of the P recommendations for cereals will stay the same, with applications usually made to maintain soils at Index 2. However, grain offtake information has been improved and some maintenance rates will change, due to fine-tuning of standard yields

Sajjad Awan, AHDB

Whether Index 2 is appropriate for all situations has been the subject of great debate. However, research has now confirmed that Index 2 continues to be appropriate for most soils. Crops grown in soils at lower indices, especially at Index 0, fail to use most of the P applied during the same year. Indeed, research shows crop recovery associated with commonly used fertilisers is extremely poor – range 0 to 8% (4% average) – and most of the unrecovered P (>90%) ends up in the soil reserves.

Over the years, several products to help improve crop P recovery have arrived on the market. These products use a variety of approaches – placement, foliar application, seed treatment and water-insoluble sources (e.g. struvite) – but, in AHDB-funded trials, none showed the reliable and convincing benefits required for a 'feed the crop' strategy to be adopted within RB209.

Although, Index 2 is still the target index, the 2020 edition sees a change in how this target is hit. Fertiliser maintenance recommendations now better reflect the commercial yields of modern cereals crops and take into account new evidence on the amount of P taken off in crop materials.

The biggest shake-up is to wheat guidance, due to the significant amount of quality information available for this crop. Currently, RB209 states that 7.8 kg phosphate (P²O⁵) per tonne is removed in the harvested grain. However, compelling evidence means this offtake value will reduce to 6.5 kg P²O⁵/t.



GRAIN NUTRIENT ANALYSIS

In addition to improvements in RB209's default offtake values, the manual will now encourage the analysis of grain samples for specific nutrients, including P. Nutrient levels in grains can provide valuable clues about how efficiently crops are taking them up. The critical level of P in winter wheat grain has now been established – 0.32% dry matter. Grain with levels lower than this value come from a P-deficient crop. Interestingly, a quarter of UK cereal crops could be under this critical value, according to recent estimates.

The amount of P removed by a crop can be established rapidly from laboratory results. On Index 2 land, if the offtake value is lower than the maintenance value, it reveals that the crop was not able to make the most of the P applied. In such circumstances, the application of additional P is unlikely to correct the deficiency.

Detective work will be required to pinpoint the exact cause or causes for the lack of P uptake. Unfortunately, crop uptake is complex and influenced by many factors. Soil temperature, soil pH, soil compaction, soil water content, crop damage (e.g. caused by herbicides, pests and disease) and low light levels all play a significant role in uptake. Only once the constraint has been identified can management solutions be determined. Regular analysis of soil has long been an essential part of nutrient management, helping to ensure soil P levels are maintained. Grain P analysis can now be added to the toolbox, as part of efforts to help crops make the most of P.

UK PARTNERSHIP FOR CROP NUTRITION

The AHDB Nutrient management guide (RB209) is updated in partnership with a number of organisations. To access the guide or for more information on the partnership, visit **ahdb.org.uk/rb209**

AT-A-GLANCE CHANGES FOR P

- Emphasis on soil and grain sampling to help fine-tune nutrient management
- New protocol on how to sample grain for nutrients and interpret results
- Changes to wheat grain offtake values
- Recommendation tables changed to reflect new offtake values and aligned standard yields – for phosphorus, as well as for nitrogen and potassium

CLUBROOT IS PATCHY, DIVERSE AND REQUIRES TARGETED **TREATMENT**

Jason Pole, AHDB Communications Manager

CLUBROOT HOSTS

Clubroot, caused by the pathogen *Plasmodiophora brassicae*, affects all cultivated and wild cruciferous plants. In addition to oilseed rape, all vegetable brassica species are affected. Other susceptible broad-acre arable crops include turnip, swede, Brussels sprouts, cauliflower, calabrese and mustard. Numerous weed species, such as charlock and shepherd's-purse, are also common hosts.



Swollen, distorted and galled roots are increasingly common in the UK's oilseed rape fields. The cause is clubroot, and short rotations, along with mild, wet conditions, have all favoured it. Throw in a diverse pathogen population and eroded varietal resistance to the mix, and it becomes clear that targeted management is essential.

When oilseed rape is grown in a clubroot-infected field, the advice is to use a resistant variety. Such varieties, which are detailed in the Recommended Lists (look for the '\$' symbol), contain the 'Mendel' mechanism and are resistant to the most common strains of clubroot. As the effectiveness of the mechanism has reduced at some sites, AHDB funded research to quantify the problem.

Soil samples from 75 high-risk clubroot fields were used to grow a resistant and a susceptible winter oilseed rape variety in glasshouse screens. In about half (49%) of these 'bioassays', the resistant variety developed relatively severe symptoms. In fact, soil from 15% of the sites saw the resistant variety develop over 30% of the symptom level seen in the susceptible equivalent – a strong indication that resistance no longer functions effectively.

Amanda Bennett, who manages soilborne disease research at AHDB, said: "Strains of clubroot that break resistance were found across the UK. Growers should make use of integrated approaches to control this disease, including the use of nonsusceptible crops in the rotation, to avoid driving the selection of resistance-breaking strains."

A random subsample (25/75 fields) of soils was also used to grow a standard set of 15 brassica lines from the European Clubroot Differential host set. The way these plants develop



clubroot symptoms allows the number of pathotypes to be established. This found that the UK clubroot population is highly diverse. In fact, 20 different pathotypes were found, in almost equal proportion.

The project also investigated targeted treatment. The clubroot severity in commercial crops (16 fields) was assessed (50 m grid squares) at three timings over a growing season. The researchers found that disease was often patchy, and targeted treatment (liming) can often make financial sense.

Visual inspection of plants and roots is the best way to map clubroot across a field. To do this, a sampling grid should be set up, using the field's tramlines as a guide, with 10 plants inspected at each sampling point. As poor patches of establishment and growth may be due to many reasons, it is important to pull up plants to inspect roots for clubroot symptoms. As clubroot persists for up to 20 years, knowledge of patches remains useful for several seasons. Prior to planting, soil tests, such as bioassays and molecular assays, can be used to gauge clubroot risk. However, in this research, detection of the pathogen in soil by molecular tests did not correlate well with disease development in the oilseed rape crop.

Comprehensive information about clubroot, including hosts, symptoms, life cycle, importance, risk factors and management, can be accessed via **ahdb.org.uk/clubroot**

This article is based on the final report of a 42-month project (21140006) that started in September 2015. The work was led by SRUC and ADAS and funded by a contract for £176,832 from AHDB, with in-kind contribution from Soil Essentials Ltd and LS Plant Breeding.

OSR DISEASE: THE GROUND TRUTH

The soilborne disease verticillium wilt has a new name – verticillium stem stripe – to better reflect disease symptoms. According to our research, consistent differences in verticillium infection levels occur between oilseed rape varieties. This means significant potential exists to produce verticillium disease ratings as part of the Recommended Lists.

ahdb.org.uk/verticillium-stem-stripe

Each autumn, phoma stem canker spores are released from infected stubbles. The effectiveness of genes responsible for resisting phoma in oilseed rape is known to be reduced by elevated temperatures. Recent AHDB research results have provided details on the genes and mechanisms that are most affected by this phenomenon. The findings will now be used to target plant breeding efforts.

ahdb.org.uk/phoma

Rhizoctonia solani is an aggressive, ubiquitous soilborne pathogen of crops worldwide, including oilseed rape. Infection can result in seed decay, as well as pre- and post-emergence damping off. AHDB-funded research has shed light on this pathogen and provided new guidelines.

ahdb.org.uk/rhizoctonia

For information on how to manage key pathogens of oilseed rape, visit **ahdb.org.uk** and search 'OSR disease management'.

MARKET INTELLIGENCE OUT IN THE FIELD #AHDBCROPTOUR

Vikki Campbell, AHDB Market Specialists Manager – Arable

This summer, your AHDB Market Intelligence team was out and about visiting key growing regions in the run-up to harvest. Avid followers of Twitter were treated to bite-size video interviews, where growers, processors and traders spoke about their crop conditions pre-harvest and thoughts on the marketing season ahead. The objective? To provide 'real time, real life' insight, giving a broad coverage of crops and regions pre-harvest.

Different regions and crops each brought their own sets of challenges. Colin Chappell, based in Lincolnshire, told us about his challenges with oilseed rape, although at the end of June his cereal crops were looking good.

Crops were also looking good, north of the border. In Fife, rainfall during wheat grain fill had reduced sunshine hours, tempering yield expectations a little. The same rainfall had caused lodging risk for barley, but nothing the crop couldn't handle.

Down in the Yorkshire Wolds, the weather up to mid-July had been favourable, although more rain would have been welcomed for some wheat crops showing signs of drought stress. However, yield expectations were optimistic. For rapeseed, after surviving pest damage, May storms during flowering had flattened some of the crop. As such, variable harvest dates and modest yields were expected.

66 To provide 'real time, real life' insight, giving a broad coverage of crops and regions pre-harvest

Our Norfolk host had also escaped the challenges plaguing many rapeseed growers during the season, so he was aiming to keep the crop in his rotations. June rainfall had increased disease pressure for the wheat crop, slightly curbing yield expectations.

In Essex, the prospects for wheat were encouraging, with weather conditions suiting the heavier soil – certainly much more than 2018's drought conditions did! The South had also experienced favourable weather conditions, leading to high winter wheat yield expectations. However, once again oilseed rape had suffered from poor establishment, due to dryness and pest damage.

The processors we met were optimistic in the run-up to harvest. With crops coming through the season relatively well, there was going to be plenty of milling wheat available. The unknown at the time was the harvest quality. For the 19/20 marketing season, Brexit uncertainty remained the largest variable. However, this shouldn't overshadow other challenges, including the ramifications of the new Agricultural Bill and the continuing ban of certain chemicals.

WANT TO GET INVOLVED?

The **#AHDBCropTour** will continue to run at key dates during the season. If you'd like to share your thoughts and progress with other farmers, traders and processors, contact Vikki Campbell (vikki.campbell@ahdb.org.uk).

2.9.949.8







#AHDBCROPTOUR LOCATIONS:

Fife Yorkshire Wolds Lincolnshire

Norfolk <u>E</u>ssex



All interviews can be viewed via **#AHDBCropTour** on Twitter. Thanks go to all those who participated in the tour.

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GRAIN MARKET OUTLOOK CONFERENCE 2019

David Eudall, AHDB Head of Market Specialists – Arable

EMBRACING VOLATILIT

Volatility is an overused and misunderstood word in grain markets. The very definition of the word, liability to change rapidly and unpredictably, implies it's something we have to endure, with no ability to protect ourselves from this unyielding, invisible force.

When in grain markets, volatility is something we can benefit from, when managed correctly. As we enter a new phase of trading for all agricultural commodity markets, it's time to stop putting off marketing decisions, take a proactive step to embrace opportunities the global marketplace offers and use all the tools available to manage your price risk.

This year's Grain Market Outlook Conference aims to provide all who attend with the starting point to actively engage with market opportunities. Firstly, my colleagues in the Market Intelligence department will join me in giving a comprehensive review of global and domestic market drivers. It's important to keep in touch with the ever-changing global market narrative of price movements, to help us make better decisions.

Secondly, we are excited to welcome Gary C. Martin from the North American Export Grain Association (NAEGA) to join us. Gary's wealth of knowledge and experience in global grain markets will help us better understand how the UK can benefit from future global trading opportunities.

Finally, we aim to finish the conference by building a business strategy based on the information we have heard during the day. Because, without a map, how can we navigate towards success?

We look forward to seeing you on the day. If you can't make it, keep an eye on **ahdb.org.uk** for updates and information after the conference.

GRAIN MARKET OUTLOOK CONFERENCE 15 October 2019, London

Free to attend

ahdb.org.uk/events/grain-market-outlook-conference



A GLOBAL VIEW

With the UK arable industry facing a future without subsidy, there's much we can learn from the North American Export Grain Association's (NAEGA) work on sustainable, commercial solutions.

NAEGA President and CEO Gary C. Martin said: "The most important attribute of our work is providing for an amicable environment that inspires individual as well as group action – people come first! Supporting and stimulating competition, responsiveness, compliance and reliability, while making safety a priority and meeting customer needs is essential. Likewise, our strategy and tactics need to include how we understand and manage strengths within the context of global, regional, national and local influences on the market."

According to NAEGA's philosophies, the world needs as little trade disruption as possible, to achieve affordable and reliable global food security and improved nutrition. But how can the UK reduce any short- or medium-term trade distortion?

Gary C. Martin, NAEGA President and CEO "Any agricultural economy's ability to respond to change, and the opportunities that result from any business environment, is closely tied to research and education. It is critical to promote and provide for communication and innovation, based on sound science and best commercial as well as official practice," said Gary.

Gary is also president of the International Grain Trade Coalition (IGTC) and, as such, has an insight into the impact of policy decisions on the economics of the world's food, feed and processing industries.

He predicts that in the next decade we will continue to experience expanded global capacity as well as demand for grains used for food, feed, energy and other products.

"Meanwhile policy, much like weather and climate, will result in considerable volatility and opportunity for market differentiation in response to a number of diverse and often mercurial changes in policies," he added.

"As policy weighs on the industries, I expect the current trend of emphasising national interests to eventually result in a renewed importance placed on policies that enable multilateral and regional trade. This includes trade rules and disciplines that are modified to reflect and incorporate best official as well as commercial practices."

Trade logistics management and new technologies are also crucial, says Gary.

"There's a plethora of opportunities to innovate technology for document digitalisation and product characteristic identification. These could bring new economies and capacity to provide for quality and safety, as well as meeting evolving consumer demand."

66 The most important attribute of our work is providing for an amicable environment that inspires individual as well as group action – people come first! 99

REFLECTIONS ON THE **RAPESEED** MARKET

Tom Hebbert, AHDB Communications Executive

This season has been challenging for oilseed rape growers. Dry conditions led to poor establishment last autumn, while cabbage stem flea beetle continues to pose a threat, leading some to abandon the crop altogether. However, for those who persevere and achieve good yields, the decline in production across Europe could mean financial rewards

In July, we published our Planting and Variety survey for 2019, showing the planted area for oilseed rape at a 16-year low. Dry drilling conditions in August 2018 meant growers struggled to get enough moisture in the crop, making it more susceptible to cabbage stem flea beetle.

"This year will see a big drop in EU rapeseed production: at 17.5 million tonnes, this is 2.5 million less than the previous year," explained Owen Cligg, United Oilseeds trade manager.

"The challenges have been felt all throughout Europe, with yields down considerably in Romania, France and Germany."

The shortfall in supply means a record amount of rapeseed will be imported into the EU market, with the bulk going to biodiesel and food markets. The imports will come from Ukraine, Australia and Canada.

In the UK, there has been some regional variation and reversal of fortunes: having struggled in the past with pest damage, growers in Kent have managed to stave off the worst this season through improved management techniques. Elsewhere, cabbage stem flea beetle continues to present a major challenge: moving westward – with growers in Wiltshire and Dorset struggling – and northward through the West Midlands and Lincolnshire. Farms in Scotland continue to be largely isolated from the pest, due to the colder growing conditions.

The deficit in European production means that market conditions are favourable for growers recording good yields, with the price likely to be supported for the foreseeable future. What's more, with no tariffs on rapeseed, Britain's impending exit from the EU could be less disruptive on prices.

However, with domestic prices tracking Paris futures, the impact of currency fluctuations could have a supportive or detrimental effect on domestic price. If we move towards a deal, this could strengthen the pound, which would negatively impact the domestic prices, and vice versa if the pound weakens, which it has been doing on news of a no-deal.

Looking ahead, what do oilseed rape growers need to look out for?

"Attention to detail is paramount," Owen said. "The most important thing is to get enough moisture into the crop, to ensure it establishes and has the best chance of withstanding insect attack.

"If growers can achieve that all-important yield of 3.5 t/ha then oilseed rape remains one of the most lucrative break crops to grow."

ahdb.org.uk/cereals-oilseeds-markets





INCORPORATING STEWARDSHIP FOR A PROFITABLE ROTATION

If you're taking a long, hard look at your business profitability, you might be considering what else you can do. Does it make sense to take poorly performing areas out of production? Do you put in environmental schemes? Does it pay off? We spoke to two farms to find out more.

ANDY BASON, NEWHOUSE FARM, WINCHESTER

Andy has 600 ha cropped area and 60 ha of low-input grass, as well as various grass margins in a mid-tier stewardship scheme.

He said: "We had ten years of the original Countryside Stewardship Scheme, then two cycles of the ELS and we've just gone back into mid-tier stewardship.

"Our ELS areas have always been grass margins and I wanted them to be more diverse and attractive, so with the mid-tier we put in something more adventurous. We put in wildflower mixes, nectar and pollen and bumblebird mixes.

"We've got quite a lot to learn, but we're excited about growing something more attractive." Andy puts his stewardship options in field corners, gateways and places where he can't get bigger machinery. The margins span the farm to provide wildlife corridors for beneficial species.

"The unknown is just how beneficial these margins will be. In terms of public perception they're great, but we want to know more about the margins."

The finances do seem to stack up, says Andy.

"We're getting more money from these stewardship options than from cropping, just because of the areas – it's poor soils or corners where we can't get the machinery."

CHRISTY AND HEW WILLETT, PARKLANDS FARM, GALLEYWOOD, CHELMSFORD

Mother-and-son team Christy and Hew Willett farm in Galleywood on the edge of Chelmsford, and host a Monitor Farm group there. Farming near so many people can have its ugly sides, says Christy, but there are also huge opportunities for diversification.

We asked them how they decide which areas of the farm to take out of production, for public access and environmental schemes.

Hew said: "It's interesting because sometimes it seems like a really good idea to give the public an amenity like a wildflower meadow, but it can't be done at the sacrifice of the farm business. I look at the historic yield data for the last four or five years, collated together, and then look at areas that are performing worse or consistently lower yielding or lower profitability, and then whether they are viable for going into an environmental scheme, or, say, a diversification scheme."

They think carefully about the interaction between public and wildlife, too.

"It can be quite ironic. People want to see wildlife but wildlife doesn't always want to see the public," Hew added.



THE RISE OF THE LOW-CARB DIET

Kim Malley, AHDB Retail Insight Manager

Every year, more and more searches are made on Google for 'low-carbohydrate diets'.

It's one of the key health trends seen in the consumer world in the last year, along with plant-based, high-protein, high-fibre and gluten-free.

'Healthy eating' means different things to different people – from removing or restricting something in the diet, to those that add benefits such as more vitamins or contribute to the five-a-day.

Health meals chosen for their restrictive nature, such as the low-carb diet, have contributed significantly more to the growth of the health market from mid-2018 than added-benefit health meals. But what impact does this have on bread and flour sales?

About three-quarters of consumers agree that carbohydrates are a key part of a healthy diet and are a good source of energy. However, 30% are actively trying to eat fewer carbohydrates as part of their individual health needs.

As this trend gains momentum, carbohydrate volume sales have levelled out at +0.2% over the last year, compared with the retail market growth of +1.2%. In that same period, potatoes have been the winners in the category, gaining +0.9% volume sales, whereas bread has seen declines of -2.6%.

However, some specialist types of bread have been bucking the trend: free-from bread sales have increased 14.6% in volume, and brown bread 85.5%.

In store, the market has seen a move towards carbohydrate alternatives, using vegetables, beans and pulses. While products do not always have low-carb claims on pack, the marketing behind these offerings imply the swap, for example, courgette instead of spaghetti.

The market is yet to see a significant range of on-pack 'low-carb' claims, but there are a few examples, including two different 'lower carb' loaves from Hovis.

ahdb.org.uk/retail-and-consumer-insight

FACT TAKEAWAY

- Over a quarter of UK adults see a high-protein, low-carb diet as good for overall health
- A typical shopping basket now features 6.3% more protein products and 4.6% more fibre products than it did five years ago
- The gluten-free market has grown in value by 116% in the last year, with 12% of shoppers claiming they avoid gluten foods for themselves or their family

Sources: Google Trends; Kantar Worldpanel, 52 w/e December 2018; YouGov/ AHDB Tracker, February 19; Kantar Worldpanel, 52 w/e 27 January 19; Plantbased -AHDB/YouGovConsumer Tracker & Mintel report; High protein & high fibre -Mintel Attitudes towards Healthy Eating UK; February 2019 & Kantar Nutrition Service, 2018; Gluten free –Mintel Free-from Report Dec 2018; Kantar Worldpanel

66 Some specialist types of bread have been bucking the trend 99

A THIRD OF **TEACHERS LOST** ON SOURCES OF FOOD AND FARMING INFO

A third of teachers do not know where to go for information on food, farming and healthy eating practices, according to YouGov research commissioned by AHDB.

111

Teachers said they were most likely to turn to organisations that are not specialist in the area, such as the Times Educational Supplement, BBC Bitesize or simply Googling for information in the absence of clear authoritative sources.

To cut through confusion and help accurate information reach classrooms, food, farming and education experts have created new guidelines for teachers and educational stakeholders to follow.

Our Director of Communications Christine Watts, said: "The research findings have helped us to create new guidelines, giving us a clearer understanding of teachers' needs and the challenges they face when teaching kids about food, farming and nutrition.

"The research suggests that about two-thirds of teachers believe they do know where to go for information, and they have a strong appetite to help our next generation to learn about food, farming and healthy eating.

"To take the burden off time-pressed teachers' shoulders, we've worked with

our industry and education experts, creating a checklist to empower teachers and those who produce content for schools, so they have confidence in the accuracy and integrity of information that is shared with young people."

The new guidelines form part of a threeyear strategic partnership between AHDB and the British Nutrition Foundation (BNF).

Roy Ballam, Managing Director and Head of Education at the BNF is also a trained secondary teacher.

He said: "Childhood obesity is a major public health concern and, in this context, it's important that teachers can share accurate information with young people, enabling them to make healthy food choices, cook balanced dishes and understand where their food comes from.

"With so much conflicting advice on food and health, the new guidelines are simple. They've been reviewed by teachers, farmers, nutritionists and exam bodies – I believe they'll help teachers to have confidence in creating, using and sharing consistent, accurate information about diet and nutrition."

A thorough consultation was carried out as the guidelines were produced, taking

feedback

from the NFU, LEAF, Public Health England, practicing teachers and awarding bodies.

"We have highlighted that inaccurate information on British farming has been shared in schools," said Joshua Payne, NFU Education Manager.

"Children absorb so much at a young age and the new guidelines should help support children learning the truth about British farming and food from an early age."

LEAF also works with organisations across the farming and education sectors.

Carl Edwards, Managing Director and Head of Education at LEAF, said: "We know there's a gap in knowledge with our next generation, which is why getting people out on farms really helps to inspire learning. After visiting, we need schools to continue to fuel that knowledge and share accurate facts. I believe the new guidelines will help teachers use correct information to better connect young people with their food and the farming environment."

ahdb.org.uk/education

YOU ASK THE QUESTIONS... MARTIN WILLIAMS VS MARKET INTELLIGENCE



We turned the tables for this article when Herefordshire farmer and Monitor Farm host Martin Williams interviewed Peter Collier, AHDB Market Analyst...

MW: What do you enjoy about your role the best?

PC: Talking to people and helping them think hard about their businesses. We're not here to tell people what to do: in my opinion our job is to ask questions, offer thoughts, and ask the right questions.

MW: We're living in very volatile times. I won't mention the 'B' word, but there are lots of things happening around the world. How far ahead do you think you can plan market intelligence?

PC: It depends on what we're looking at. We can plan the fundamentals a lot further ahead than the short-term drivers. Fundamentals will be things like planting intentions; yield; supply and demand. These formulate our longterm view, although there's going to be volatility even within the long-term perspective. The short-term drivers are things like currency fluctuations and political drivers.

MW: After the 'B' word, there could be a fair restructure in agriculture. Do you see cereals as a winner or a loser in that?

PC: We need to talk about what we're growing for. I don't think we should be looking at export markets for cereals. We need to look at our own domestic market and what we're growing in the UK. Who would we compete with for barn-filling, high-yielding group 4 exports? It'll be Ukraine, Russia and the Black Sea – countries with a lower cost of production, lower land values and bigger port capacity. We need to focus more on domestic markets, particularly for cereals.

The export opportunities will be in added-value products like malting barley, malt, beer and whisky.

MW: Where do you get your market information from?

PC: The USDA is great but it's not by any means the sole provider of information. There's the Australian Abares, many organisations for South America and Ukraine, France and Europe as a whole.

There's a lot of information, and our job as market specialists is to collate all this information and put it out in a succinct, meaningful way to farmers. We can spend hours a day sifting through technical reports and spreadsheets of numbers, where farmers wouldn't necessarily have the time to do this.

MW: And where do you see AHDB Market Intelligence's role in the next ten years?

PC: We act as a 'market failure' organisation, providing information where it might otherwise be lacking. I think cereals marketing will become much more important over the next few

years, as agriculture has to become profitable and farm business structure may have to change slightly. It's all well and good trying to cut your costs and improve your margins on fields, but if you can make another £10/t a year on your wheat through effective marketing, that job is already made a lot easier for you.

MW: Well, we seem to rely on spikes, don't we? If you can catch a spike, it makes a huge difference to your bottom line.

PC: I think farm businesses have to work out what a good price is. Until you know what your costs of production are and what is profit, how do you know it's a good price to sell at? Everyone always wants more.

MW: When wheat is at £190/t, a farmer will wait for £200/t.

PC: Exactly. And yet, they may be making £40 or £50/t on that – it's a good price. And Farmbench helps people to get a better handle on their costs. Once you've got your costs, then you can know your margins and work out when to sell.

MW: I'm quite a fan of Farmbench. If you don't know, how can you guess?

PC: Knowing your costs is essential to sell at the right price. But once you've sold, you don't have to think you're out of the market. If you were to take an option out, you'd get the opportunity to take advantage of future price moves.

Personally, I think options are underused. They work in a similar way to insurance: you pay a risk premium to set a minimum price. If you use Farmbench, knowing your breakeven selling price lets you make more informed decisions about the marketing tools available to you. **MW:** The Chinese have just lost 20% of their pigs, which is a significant proportion of the global pig population. Does that affect the trade in wheat?

PC: It affects soya bean trade a lot. I know soya beans aren't an attractive topic for UK agriculture to talk about, but if we're looking at oilseeds and oilseed rape, we can't ignore soya beans.

African Swine Fever is going to affect the demand for oilseeds in China. And we've had the highest ever stocks of soya beans in America and production is going to be good again this year. So there are a lot of soya beans in the world, which could really depress that whole oilseed complex.

MW: Do you think it makes oilseed production in the UK untenable at the moment, added to the cabbage stem flea beetle problems we're having?

PC: I don't think it does. It's still an attractive crop, where you're not suffering too much pest pressure. There's still a domestic demand, at about 2 million tonnes this year – and we're looking at about 1.7 million tonne production. I know a lot of people feel like they don't want to plant oilseed rape for next harvest [2020], but when it comes down to it, to the gross margins and other viable alternatives, oilseed rape has got to feature.

If you'd like to be the one asking the questions in a future article, get in touch.



AHDB is preparing a new five-year strategy, which will include an environmental focus, with practical objectives for farmers and growers.

These include:

- Helping UK farmers, growers and processors supply the evidence required to comply with any proposed new legislation – and access ELMS funding
- Help farmers and growers understand how supporting the environment supports productivity
- Be a trusted source of information on the environmental footprint of UK livestock and crop production

This work has been a long time coming. It's exciting for me because it's the culmination of my work over the last 20 years.

We know that a lot of people in the industry are already working on some of these topics, and so AHDB's work will fit in with industry partners like Defra, CEH (the Centre for Ecology and Hydrology), ADAS and the RPA, as well as retailers and farmer groups. Although in very early stages, one of our aims is to work with the industry to create a system for environmental benchmarking. We want farmers to be able to access a system that allows them to better see the local environmental impact of their farm on the surrounding environment.

AHDB will be focusing on emissions and diffuse pollution to air, soil and water, and working with our partners to provide information on biodiversity.

The environment is now high on the political agenda, with the recent announcement of the UK to achieve carbon neutral status by 2050 – our work will be about helping farmers and growers respond to the challenges ahead in a way that is sustainable for their businesses.

To find out more about AHDB's new strategy, visit **ahdb.org.uk**

We'll be focusing on emissions and diffuse pollution to air, soil and water

Learn with us this winter

Join one of our free events this winter for the low-down on integrated pest management (IPM), grain markets, supply chains and more.

GRAIN MARKET OUTLOOK CONFERENCE: 15 OCTOBER 2019 GLOBAL BRITAIN (LIVESTREAM EVENT): 22 OCTOBER 2019 AGRONOMISTS' INDUCTION: 22 OCTOBER 2019 COLLEGE LECTURERS' DAY: 30 OCTOBER 2019 SUPPLY CHAIN CONFERENCE: 28 NOVEMBER 2019 AGRONOMISTS' CONFERENCE: 3–4 DECEMBER 2019 AGRONOMY 2020 SERIES: EARLY 2020

ahdb.org.uk/events

MAKING BISCUITS IN ALGERIA

UK wheat was the star of the show when the AHDB Exports team took their biscuit-baking workshop to Algeria. During the two-day mission, bakers from ten Algerian companies made 12 different types of baked goods, guided by Campden BRI's flour experts.

Two of the bakers, both important decision-makers in Algeria, told us what they thought.

DR MALEK ABOUDAOU, DIRECTOR OF PRODUCTION, RESEARCH AND DEVELOPMENT, SARL ISO 9 INTERNATIONAL, ISSER DELICE

We bake cupcakes, chocolate fondant cakes and laminated flat biscuits. We've got a medium-sized business, taking about 20% of the market share in Algeria, and our main consumers are children.

So far, I've only really worked with UK wheat at workshops, where I've tried baking different biscuits and cakes.

With **ukp** flour, I can greatly reduce the amount of sodium metabisulphate (SMS) in my biscuit recipes. We would use SMS to relax the dough, making it easier to work. But with **ukp** I don't have to use so much SMS, which saves me money and also makes the biscuits healthier. Unlike other bread flours that produce very tough, tight doughs, **ukp** flour makes a softer dough. I have never seen this in other bread flours before.

Sadly though, I can't choose what wheat I want to purchase because the government imports all the wheat and they don't specify the origins to the millers.

EXPORTS

IMED KECHACHA, RESEARCH AND DEVELOPMENT MANAGER, SOBCO PALMARY - BISCUITERIE **CHOCOLATERIE**

We produce about 120 tonnes of biscuits a day, making us probably the third largest biscuit manufacturer in Algeria. We want to imitate biscuits from other countries - to make our own Oreo-style American biscuits, Milka chocolate biscuits from Eastern Europe and Tuktu-style biscuits from Turkey. We're also thinking about producing digestive-type biscuits like you have in the UK.

The workshop was the first time I handled UK wheat. I wanted to familiarise myself with UK wheat and I found that it's capable of making excellent biscuit products. It's a stretchy dough and extensible, so keeps its shape when we roll it out. I would be happy to include UK wheat in my biscuit products.

ahdb.org.uk/exports



CIBLE



Sobco biscuiterie

EXPORTS

ALGERIA: COUNTRY PROFILE

CONSUMPTION



2-2.5 Mt

PRODUCTION



250,000 hectares

IMPORTS



SPECIFIC	HAGBERG FALLING	w:	PROTEIN: 11%
WEIGHT:	NUMBER AT LEAST:	160	
78 KG	240 S	MIN	
i o no	:	: IVIIIN :	mile Mitates

ALL IMPORTS ARE MADE THROUGH THE STATE-OWNED CEREALS OFFICE, OAIC

AHDB Grain Outlook EXPORTS

*Source: Grain and Feed Annual, March 2019; USDA; Strategie Grains

IS YIELD KING?

Since the 1970s, UK average wheat yields have hovered around 8 t/ha, with barley at around 5.6 t/ha. Yields of at least double that are possible, but would they pay off?

Following a lively debate at Cereals 2019 with our Monitor Farm hosts and visitors on whether yield is king, we posed the guestion again to Twitter and Facebook.

The answer was loud and clear. Yield is great, but profit margins matter more.

AHDB supports the annual Yield Enhancement Network (YEN) competition, where growers in the UK (and worldwide) compete for the highest yields. But what's important, amid all the extra costs and perfected spray-timings, is a keen eye for financial detail and dedicated benchmarking. Do increased yields bring an overall benefit to the businesses?

For some, like Jamie Leslie who grows spring barley for feed on very sandy soils in Shetland, pushing for higher yields did pay off.

He went from a traditional approach of growing barley without much attention, to putting a lot more thought into it - thanks partly to discussions with other farmers on WhatsApp and through the YEN network. Jamie applied foliar potassium, more nitrogen and targeted his PGR more.

"We got 7.9 t/ha which surpassed our expectations, certainly. Our rolling five-year average would have been 5.5 t/ha," he said.

Before YEN, Jamie had a low-input, traditional barley growing system, which cost about £400/ha to grow. For the YEN entry, a Planet spring barley crop, he increased the input cost by £190/ha.

"Obviously, our fertiliser costs are a bit more than on the mainland, so those input figures might be guite high. But the main thing is, it doesn't really matter what you spend, as long as the cost of production is ok," Jamie added.

The proof for Jamie was in the profit. With the new increased and more focused inputs, Jamie's profit per hectare increased by £480, compared with the old low-input system.

He said: "So we definitely saw a big cost benefit by paying a bit more attention to what we were doing and applying our inputs in a more timely and precise fashion. It's really about knowledge transfer, benchmarking and just paying a bit more attention to what you're doing."

ASKING THE INTERNET...

We posed the same question on Facebook and Twitter - is yield king? What do you think?

AHDB Cereals

ed by Ele

14% I aim for highest yields

86% Profit margins matter

yield king?'. What do you think?

Ahdh Hold

Last month at Cereals 2019 we asked the Monitor Farm gro

Here's how people voted:

TWITTER (54 VOTES)

- I aim for highest vields 11%
- Quality is more important 7%
- **Profit margins** matter 81%

FACEBOOK (95 VOTES)

- I aim for highest
- yields 14% **Profit margins**
- matter 86%

*Facebook polls only allow two responses. Twitter figures have been rounded and therefore may not add up to 100%

OAHDB_Cereals	~
Last month at Cereals 2019 we asked the #mon debate 'ls yield king?'. What do you think?	itorfarm
taim for highest yields	11%
Quality is more important	7%
Profit margins matter	81%
s4 votes - Final results	
NOW ZIN ZEEDS	1.51
AHDB Cereals & Oilseeds created a poll.	

h [7] - 23 hrs O

GETTING TO THE **ROOT** OF THE **MATTER**



Emily Pope, AHDB Knowledge Transfer Manager

With summer rainfall decreasing, or at least becoming more unpredictable, it's important that crops can make the best use of any available water. We need to know how our current farming practices affect the plants' ability to access and use water, and what we might be able to do, to improve things in the future.

That's why AHDB's Strategic Cereal Farm West is home to a replicated tramline trial looking at the impact of different cultivation strategies on crop rooting, yield and soil health. Rob Fox hosts the Strategic Cereal Farm just outside Learnington Spa, Warwickshire, where on-farm trials are linked to research findings.

An AHDB PhD project (Student Report No. SR41 Quantifying rooting at depth in a wheat doubled haploid population with introgression from wild emmer) completed by Christina Clarke reported that wheat crops grow insufficient root length in deeper soil layers and therefore cannot take up available water in the subsoil. The optimum root length density (RLD) is 1 cm/cm³ but past studies, as reported by Christina, have found that wheat in the UK often has RLDs less than this, below depths of 40 cm.



The 16.9 ha trial of winter wheat for harvest 2019 included three cultivation depths on medium to heavy clay. Each cultivation depth is repeated again in a different part of the field.

The 5 cm cultivation depth treatment was established using a disc cultivator and the 10 cm and 15 cm cultivation depth treatments were established using a single pass deep soil cultivator.

The 15 cm treatment had an additional pass of a subsoiler. The seedbed preparation for all treatments was completed using a spring tine, followed by a tine seed drill on 19 October 2018 and all treatments were rolled.

The cost of establishment for the different cultivation depths ranged from £55.66/ha at 5 cm, to £79.45/ha at 15 cm and £112.01/ha at 30 cm.

Once the trial had been established, the Strategic Farm research team used a penetrometer to identify locations to represent a range of soil conditions within each tramline. They then used the maximum, medium and minimum penetrometer resistance (MPa) at a depth of 30 cm, from 20 random positions, as sample positions to monitor differences in soil properties and crop growth during the trial.

This spring, the team excavated wheat plants and assessed traits above and below ground. They counted:

- Number of tillers on each plant
- Width of the root system
- Depth to maximum width: the vertical distance from the base of the shoot system to the point of maximum width
- Root system angle: the angle from the horizontal of the outermost roots on both sides of the crown at approximately 5 cm from the shoot base
- Whole crown branching density: the number of roots coming off the main axes, measured using a 1–5 scale, where 5 is the highest
- Nodal root length and number of nodal roots per tiller: nodal roots appear primarily on the crown, which is typically one to two centimetres below the soil surface
- Number of seminal roots: seminal roots emerge before the second leaf appears, sometimes referred to as primary roots, and generally grow deeper into the soil than nodal roots

ANVA CONTRACTOR

• Root biomass: the total dry weight of live roots



The team then assessed root length density down the soil profile, to a depth of 1 m, at the more mature growth stage of post-anthesis.

With the shallow cultivation depth (5 cm), the surface layer was more compacted, which led to wider root angles.

A wider root angle could reduce maximum rooting depth and rooting biomass at depth, due to increased horizontal growth, meaning that the plant could be less able to take up water.

To see whether this is true, the Strategic Farm team took 100 cm soil cores between flowering and grain fill, to look at root length density and biomass in the deeper soil profile.

By dividing the soil core into 20 cm sections, the researchers can see whether easily measured features of the root crown are associated with root length density further down in the soil.

There was some evidence of subsoil compaction in the deep cultivation treatment (30 cm), which seemed to reduce the number and length of nodal roots. This, in turn, reduced the number of tillers and above-ground biomass.

However, where compaction was found at shallower depths within the top 15 cm, nodal root numbers increased. This suggests that the crop might produce a greater number of nodal roots to compensate for restricted growth in root length.

Winter wheat at GS15. The AHDB Wheat growth guide illustrates how the crop grows and develops. It also explains how to measure crop progress ahdb.org.uk/wheatgg



SOIL HEALTH

The research team has also been assessing the soil conditions using the soil health scorecard (see pages 6–7) and looking at earthworm populations using the AHDB factsheet, How to count earthworms. An active population for arable soils is deemed to be eight or more per 20 cm³ pit.

ADAS Action depth on soil health			
Cultivation depth	5 cm	15 cm	20.00
% clay	38	39	30 Cm
SOM (%)	4.1	4 1	39
рН	7.0	7.0	
Ext. P (mg/l)	20	26	
Ext. K (mg/l)	192	100	16
xt. Mg (mg/l)	712	199	216
ESS score	112	821	
enetration resistance (MPa)	4	3	
epth of max resistance (cm)	1.12	1.07	1.22
arthworms (number)	10	20	30
(idilibel)	2	2	4
Investigate	tor	No action needed	

To find out more about these and other trial results, join us at the Strategic Cereal Farm West results day on 27 November (Warwickshire) or 12 December (Gloucestershire).

ahdb.org.uk/events

TOMORROW'S WORLD OF TECH

Harry Henderson, AHDB Knowledge Exchange Manager

A RETURN TO PRE-HERBICIDE DAYS

We know we're losing active ingredients one-by-one through legislation or resistance problems. There's some new technology coming up that sits on the back of the combine that could help keep weeds at bay in the new regime of cultural control.



First, there's the chaff deck. It collects chaff from the back of the combine, weed seeds and all, and arranges it in two rows behind the wheelings to rot down.

Second is the seed destroyer, which is designed to kill any weeds that come out of the combine. You might think, well, that's not so useful because a lot of the black-grass seeds would shell out onto the ground before harvest. But then, someone said to me at a Monitor Farm meeting in Brigg – you need to stack your cultural controls in many ways, like you stack your chemical controls when you put your chemical controls into the sprayer.

It's a new way of thinking of things and it's going to have to be the way forward.

IS IT WORTH THE WEIGHT?

The thing we've lost in farm technology is the lightweight aspect of the machinery. We've gone headlong to try to reduce labour costs on the farm, but of course now we're looking at a 790 hp combine arriving on the market, which is easily going to cost in excess of \pounds 500,000. The combine will probably weigh over 50 tonnes when it's fully laden, all to try to reduce the labour count on farm. Have we gone too far? Could automation make machines smaller?

KEEP IT SIMPLE

Some of the upcoming technologies aren't necessarily full of electrical wizardry.

A company in Lincolnshire developed a combine header that also incorporates the cylinder and concave. As soon as the crop is cut, it goes into the cylinder and concave and gets thrashed. The straw comes out of the back of the header and can either be chopped or arranged in windrows. The chaff and grain material goes on to be sorted in another operation. So it's a much simpler system of combine harvesting than we have at the moment.

DRONING ON

Drones are an interesting one. How much can they actually do? And, critically, are you going to act on the information the drone picks up?

111111

There are bigger, diesel-powered drones in Japan that can go in and spray or seed inaccessible areas such as hillsides and marsh lands. In certain situations, the larger drones could be worthwhile. I heard about an idea for a bank of drones on an articulated trailer to help with hillside bracken control. One would be filling, one spraying, two would be coming out and going back – you'd have a relay of drones that would go out and spray a particular area. And yes, where a vehicle can't get, the larger drones could be really effective. Join the conversation at your local Monitor Farm. Search ahdb.org.uk/events for meetings near you

HAVE YOU GOT THE POWER?

It's interesting hearing people talking about electric power. A gallon of diesel contains the most power for that volumetric area. If you had a battery that was the size of a gallon of diesel, it wouldn't last as long as the diesel. The aim, then, is to reduce the actual power consumption, rather than change the source of power itself. So can you reduce your power consumption on farm? That's the best thing.

REAPING REWARDS: IN YOUR AREA North West and Northern Ireland

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DESIGNING A PROFITABLE ROTATION

At a recent meeting at Warrington Monitor Farm, we talked about choosing a profitable rotation and making a profit from break crops with Jon Stables from Berrys. One of the key messages was about having a more flexible approach to your rotation, which is something that was echoed by Nick Pyke (former CEO of FAR in New Zealand) at the Monitor Farm conference last year.

This is something a lot of people are thinking about, including Robert Cross, the Warrington Monitor Farm host. At the summer farm walk at Warrington, we talked at length about the crops that Robert is growing and why he chose to grow them.

With the loss of active ingredients, it is becoming even more important to consider pests and diseases when looking at your rotation. We saw a very good crop of oilseed rape, but with cabbage stem flea beetle moving further north every year, it is something Robert is keeping an eye on, along with the pigeons and slugs.

Although black-grass hasn't really taken over in the North West like it has in other areas, grass weeds are still an important factor in deciding Robert's rotation. Ryegrass and sterile brome are the main problem weeds. With resistance being found in both of them, they can be hard to manage with pesticides, so getting your rotation right is even more important.

Another important consideration for Robert is the market. He is always sure of where his crops will be sold before he even plants them, and he understands his costs, allowing him to understand what price he needs to get, to break even or make a profit.

Ultimately for Robert, it is all about having a rotation that is both sustainable and profitable. Farmers need to be more flexible and adaptable and make the most of prices.

The Monitor Farm at Warrington came to a close after three successful years, this summer. Robert has now handed over the baton to Bill Webb in Hale Village, the new Monitor Farm for the North West.

Choosing a profitable and sustainable rotation is a key theme in this year's regional agronomy events. To find out more, visit **ahdb.org.uk/events**

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Hale Village: 7 November
- Downpatrick: 12 November
- Downpatrick: 10 December
- Hale Village: 12 December

ahdb.org.uk/events



REAPING REWARDS: IN YOUR AREA **North East**

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MICRONUTRIENTS AT SALTBURN

Having an eye for detail is a trait of a top-performing farmer, according to AHDB's horizon-scanning work. Growers in the Saltburn Monitor Farm group have been doing just that.

Looking beyond traditional on-farm inputs, they have been discussing the use of micronutrients along with wider agronomic and farming practices to improve plant health and yields.

The micronutrient manganese activates enzymes involved in protein synthesis, lipid metabolism and photosynthesis. Zinc and molybdenum are required for enzyme processes, to keep the plant functioning.

Copper is an essential component of proteins involved in metabolic pathways. It's important for production of viable pollen in grain production and has a role in maintaining cell wall structure. Boron also helps to maintain plant structure.

The risk for micronutrient deficiencies depends on many factors including crop type, soil type, pH and the interaction between different nutrients. Looking at the history of nutrient shortage and pH levels on farm can help highlight a risk.

Micronutrient deficits are often indicated by visual symptoms in the plant but tissue testing and soil analysis can also be used to diagnose deficiencies.

If soil analysis confirms the deficiency, correction can be made through liming, seed treatments, seedbed fertilisers or autumn applications, if possible. If tissue analysis confirms a deficiency, foliar-applied fertilisers are the best way to correct the deficiency.

The Monitor Farm group also discussed the use of on-farm trials to see if micronutrient amendments are making a difference to the crop. A tramline trial can help show if additional inputs are making a difference to yield and if the additional cost is worth it.

Crop nutrition is a key theme for this year's regional Agronomy events. For more information, visit **ahdb.org.uk/events**

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Huggate: 13 November
- Huggate: 13 December ahdb.org.uk/events



REAPING REWARDS: IN YOUR AREA West and Wales

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DESIGNING A COST-EFFECTIVE INPUT STRATEGY

Integrated pest management (IPM) is a hot topic at the moment – how can you make sure you have a healthy crop without solely relying on rapidly diminishing chemicals or risking an impact on the bottom line?

Tom Rees, Pembrokeshire Monitor Farm host, is determined to consider all options to make sure his crop is healthy and his business is sustainable.

"Know your target diseases – start with rotation and see chemicals as the final part of the jigsaw," Tom said.

Variety choice is a big component to Tom's IPM strategy. Focusing on the agronomic features rather than yield is his first step to a healthy crop.

He said: "Look at variety choice – choose varieties with strong agronomic traits, tailor the drilling date and according seed rate in line with the disease risk."

The Recommended Lists are based on independent national trials, to provide information on how varieties perform in different regions of the UK.

Tom starts with a higher disease risk variety and then sets a budget as a guide, factoring in a realistic yield and quality potential. He then looks at the sprayer capacity and the weather, to plan a sustainable spray strategy.

"As part of a resistance management strategy, you have to consider all these things," Tom said.

SHOULD I SPRAY OR SHOULD I GO?

The final piece in the jigsaw is the use of chemical controls. It's important to crop walk before spraying, to assess pest and disease risk. Check the crop has reached threshold before spraying, to minimise the risk of unnecessary sprays wasting money and minimising chemical efficacy. For example, this year he cut back on T1 because conditions were dry, but then spent what he'd saved on T3 instead.

Tom aims to crop walk every two or three days before T2, to confirm that the fungicide strategy is still appropriate.

Tom said: "I start the plan with T2, as it tends to give the most consistent response."

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Pembrokeshire: 28 November
- Bridgnorth: 6 December
- Loppington: 26 November
- Hereford: 10 December
- Loppington: 17 December

Strategic Cereal Farm meetings:

- Warwickshire: 27 November
- Gloucestershire: 12 December ahdb.org.uk/events



He looks at the weather, risk of disease and potential of the crop to adjust sprays and spend.

"If you're on top of everything, you could still grow higher-risk varieties," he said.

IPM is a key theme for this year's regional Agronomy events. For more information, visit **ahdb.org.uk/events**

REAPING REWARDS: IN YOUR AREA **South West**

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TAKE THE EMOTION OUT OF FARM DECISIONS

Farming can be an emotive topic but, for Taunton Monitor Farm host Richard Payne, it's all about using the right data to make the right decisions.

Key for Richard is benchmarking with AHDB's Farmbench – comparing costs of farming with a group of like-minded farmers to see where each business could be making improvements and savings. This financial data, together with yield maps, phosphorous (P), potassium (K) and pH maps, and normalised difference vegetation index (NDVI) imaging, gives Richard a solid ground for business decisions.

"The reality of the figures helps take some of the emotion out of difficult decisions," Richard said.

He farms 280 ha at Manor Farm in Heathfield, and held an open day for the Monitor Farm group in July.

He said: "We had a great discussion about how to use the data we've got. There weren't any concrete answers but it has given us plenty to think about.

"We did all agree that it would be good to work out how to do gross margin maps."

A gross margin map would show which areas of individual fields were generating a margin sufficient to cover the fixed costs of the business as they stand.

"The next question, though, is to know at what level of margin you start to alter your cropping. You have to make sure that you don't transfer the problem from one part of the farm to another, for example, if you put flower margins around the field, then the headlands would just be further in the field.

"And we are also still strongly considering a joint venture on machinery," Richard added.

Richard also emphasised that it's important not to make decisions on one year's data only.

This autumn, Richard will be trying out more direct drilling, using existing kit, and also sowing cover crops in front of spring barley or potatoes.

The next meeting of the Taunton Monitor Farm will be on 7 November 2019. For more information about the Monitor Farm meetings, contact Philip Dolbear, **philip.dolbear@ahdb.org.uk**

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Malmesbury: 4 November
- Saltash: 6 November
- Taunton: 7 November
- Malmesbury: 2 December
- Taunton: 12 December
- Saltash: 18 December ahdb.org.uk/events



This year's regional Agronomy events will feature more on the topic of farm business efficiency. For more information, visit **ahdb.org.uk/events**

REAPING REWARDS: IN YOUR AREA South East

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LET EVIDENCE GUIDE OUR DECISIONS

Mark Bowsher-Gibbs, Sittingbourne monitor farmer, attended Evidence Week in Parliament to talk about the important role that research and evidence play in helping farmers make business decisions. Evidence Week, held in June, brings together MPs, peers, parliamentary services and people from all walks of life across the UK, to talk about why evidence matters.

Mark runs a mixed farm in Kent, growing combinable crops, apples, pears and cherries as well as running 1,500 sheep on his 1,900 ha farm. For the past three years, he has been a Monitor Farm host, opening up his business and providing a platform for peer-to-peer learning.

He's keen that science-based evidence is a crucial part of future policy decisions and support payments, particularly as the UK prepares to leave the EU.

Direct support payments are likely to be replaced by new Environmental Land Management Schemes, ELMS for short, aiming to deliver 'public goods' such as improved air, water and soil quality, increased biodiversity and climate change mitigation.

Mark said: "We continually face political and environmental challenges to our business that impact directly on our farming methodologies and, ultimately, our ability to prosper. Many of these challenges are at risk from either emotive bias or political gain.

"We, as farmers, can and will continue to deliver but we need science-based evidence to verify our work to the public."

And Mark does practise what he preaches. As part of his integrated pest management (IPM) strategy, he uses data like AHDB's aphid risk forecast tools to determine the right control treatments. This, in turn, can help him eliminate unnecessary insecticide use and protect beneficial insects.

As a fruit farmer, Mark is also interested in using research and evidence to meet the labour demand on his farm.

IPM is a theme at this year's regional Agronomy events. To find out more about an event near you, see **ahdb.org.uk/events**

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Petworth: 24 October
- Basingstoke: 31 October
- Canterbury: 7 November
- Basingstoke: 12 November
- Petworth: 14 November
- Basingstoke: 10 December
- Petworth: 12 December ahdb.org.uk/events



REAPING REWARDS: IN YOUR AREA **East Anglia**

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FARMING WITH IPM IN MIND

Farming as a systems approach is nothing new – we have always farmed with the soil, water and weather in mind, and protected crops from pests, weeds and diseases. However, with the reduction of key plant protection products, the importance of integrated pest management (IPM) and looking after the environment high on the agenda, a new generation of this systems approach has been born.

This IPM theme has been an underlying thread of our Monitor Farm meetings over the last winter, with discussions around farming with lower inputs from Andy Howard or how the Game & Wildlife Conservation Trust is focusing on reducing inputs, while maintaining yields and maximising profitability.

The summer meeting for the Duxford Monitor Farm delved into more detail about how using a stewardship scheme could benefit the farm agronomically and environmentally.

Tom Mead, joint Duxford Monitor Farm host, sought the group's feedback and experiences for entering into a mid-tier environmental stewardship agreement for the farm.

He costed out the scheme options, including payments and costs, alongside the farm's five-year average yields, prices and costs, to find the best location for the options and payback for the scheme.

With an average margin over five years for the farm at $\pounds475$ /ha (with sugar beet in the rotation), the break-even yield for stewardship over winter wheat was 7.47 t/ha for a nectar flower mix (AB1) or 6.75 t/ha for winter bird food (AB9).

The group considered a variety of options:

- Siting nectar flower strips on field margins to enhance pollinators and allow for IPM
- Using options to straighten up fields and protect watercourses, while considering the aspect
- Low-yielding areas
- Balancing permanent and rotational options

If the application is successful, this stewardship scheme has the potential to benefit the farm business, farmed environment and arable cropping, while providing a return for the future.

Join us at the Chelmsford and Diss Monitor Farm meetings over the winter, where we'll be talking about boosting pollinators and beneficials, and at the regional Agronomy Event, where we'll have presentations on IPM, aphids and BYDV and CSFB.

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Diss: 5 November
- Chelmsford: 8 November
- Duxford: 15 November
- Diss: 3 December
- Duxford: 9 December
- Chelmsford: 13 December Strategic Farm meetings:

Strategic Cereal Farm East: 26 November ahdb.org.uk/events



All the meeting details and information on the regional Agronomy series are available at **ahdb.org.uk/events**

REAPING REWARDS: IN YOUR AREA **East Midlands**

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COMPOST FOR ORGANIC MATTER

Northampton's Monitor Farm host Rick Davies has been making his own compost, to try to increase his soil organic matter.

This year, he made 1,000 tonnes from woodchips, waste turf and manure from cows and horses. He bought a second-hand compost turner and is pleased with how it is working.

"You can't alter the sand, silt or clay content of the soil but you can change the organic matter," he said.

He wants to improve his organic matter to increase carbon sequestration and build resilience in the soil. Nearly half of the carbon footprint of a loaf of bread is influenced by what happens on farm, and Rick is seizing the opportunity to put carbon back into the ground.

A higher organic matter content also improves the soil's ability to hold water, which means the crop will be able to make better use of rainfall, with a reduced risk of run-off.

Rick has learnt from his two-part Monitor Farm meeting series on soil health to create his own benchmarks.

"All soil is different. I need to know what good looks like on my farm.

"Know your soil by putting your observations in context. What does your worst soil look like? What could your soil look like? A clue is under a hedge. You can use these observations to create your own benchmarks," he said.

Soil is not the same, field by field, or even within a field, and the best approach to understanding soil is to go out with a spade. Doing visual assessments and tests to understand the biology, chemistry and physics of the soil will give a better understanding of where the soil is now, and where it needs to get to.

See pages 6–7 for more information, on the soil health score cards.

Soil health is an important topic in this year's regional Agronomy events. For more information see **ahdb.org.uk/events**

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Brigg: 1 November
- Vale of Belvoir: 14 November
- Northampton: 26 November
- Northampton: 10 December
- Brigg: 11 December
- Vale of Belvoir: 12 December

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REAPING REWARDS: IN YOUR AREA **Scotland**

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SCOTTISH CROP OUTLOOK

At the time of writing (August 2019), the latest AHDB area figures for Scotland showed a broadly stable trend in areas for most of the main crops. However, the area of spring barley in 2019 was forecast to decline by about 17kha, to 239 kha. Of that planted for harvest 2019, the AHDB variety survey estimated that 69% of spring barley was malting varieties.

Given the favourable weather this spring, we should be using the five-year average to forecast production. This yield of 5.8 t/ha would give a production figure of 1.386 Mt, which would be unchanged year-on-year as higher yields counterbalance the lower area. So, on the face of it, Scottish malting barley is set for a good production year if quality holds up.

For the wheat crop in Scotland, AHDB is forecasting a slightly higher area at 103 kha, up 3 kha on the previous year. Again, crop conditions are looking favourable, so using a yield of 8.5 t/ha would give production of 875 kt. This would be an increase of nearly 200 kt on 2018 harvest.

Over the 2018/19 season, distillers moved away from Scottish wheat to use cheaper imported maize. The price relationship will, ultimately, decide where distillers source grain. However, the larger domestic crop and a market without a sharp price rally in wheat could offer an incentive for distillers to move back to domestic source of grain.

But what of the rest of the world? Uncertainty from the supply and demand fundamentals, political interference in grain markets and volatility from external markets will continue.

The US has had an awful spring, with planting of crops almost impossible across large areas. However, weather in the last month has been favourable and those crops in the ground are showing excellent yield potential.

We must not forget the total world view and that is of a rebound in wheat production in the EU and another year of Black Sea grain being aggressive in export markets. Without the US issues, the longer-term grain outlook would be bearish and we mustn't forget this.

With all the uncertainty and volatility in markets, knowing your cost of production and being decisive with trades when you see a profit, will keep farming businesses in good stead.

DATES FOR YOUR DIARY

Monitor Farm meetings:

- Angus: 31 October
- Borders: 13 November
- Angus: 21 November
- Sutherland: 27 November
- Morayshire: 3 December
- Shetland: 7 December
- Angus: 19 December

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The Scottish Monitor Farm project is funded by the Scottish Government and European Union's Knowledge Transfer and Innovation Fund, and is run jointly by Quality Meat Scotland (QMS) and AHDB Cereals & Oilseeds.



The regional Agronomy events in early 2020 will include information on how to get the best out of your crop. For more information, visit **ahdb.org.uk/events**

AHDB Agronomists' Conference 2019

3-4 December 2019, Leicester

This conference will make you think differently about agronomy.

The two-day technical conference will showcase the latest research on integrated pest management and provide agronomists with practical management strategies to use across the rotation.

Day one of the conference focuses on cereals and oilseeds research, while day two will highlight the latest research on potatoes.

Both days will feature presentations and interactive workshops, together with panel discussions, to provide plenty of opportunity for you to question experts, researchers and PhD students.

ahdb.org.uk/events/agronomists-conference

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