



H A R V E S T 2 3

REVIEW

WELCOME

THE RIGHT DATA

+

THE RIGHT TIME

=

THE RIGHT DECISION



At the start of this month, the UK hosted a seminal international conference on artificial intelligence. Few will have missed Rishi Sunak's moment with Elon Musk and the, perhaps hyperbolic, warnings of job eradication or killer robots...

Nevertheless, the summit was another key reminder to us all that technology and the economy are facing change and opportunity. Right across industries, data and digitisation are set to take their next step through AI as routine tasks become prey to automation, particularly through machine learning and neural network technology.

While this may seem a world away from the daily crop walk, make no mistake - data analytics and AI are going to propel agriculture forwards also: through value, efficiency, sustainability, and informed decision making.

Against this backdrop, I am delighted to introduce our Harvest23 Review.

This report serves to provide a view of the 2023 harvest, through the lens of YAGRO's tools and team of experts. As you will see, the report reflects an intriguing and varied season with wide spreads in yields and prices.

How does the individual manager or owner respond to such a season? For the risk averse, the yield variability of KWS Extase shown in chart 18 may give you pause for thought. Similarly, the now common volatility of fuel prices reflected in chart 2 might lead you to review your purchasing approach through key periods. On the other hand, if you are seeking efficiency, SY Insitor's Cost of Production per tonne is 50% lower than another common Group 4 Wheat, Graham, as shown in charts 14 and 20.

Do not take this report as specific advice in itself; the examples above show how every farm has different needs, and can draw different conclusions from a set of industry-wide data. By presenting cropping statistics and trends from the 2023 season, we instead aim to showcase the valuable role of data in informing decisions on farms.

We have focused largely on Variable Costs of Production as one measure of production efficiency. We analyse COP on a per hectare and per tonne basis. This is presented by crop, by variety and by end market grouping. We also look into fuel, and feature CRMAGri who provide a round-up of the grain markets.

I would like to congratulate our team on pulling this first report together, and of course our community of farmers and advisors using our data services day to day, who make this possible.

Our reports will evolve over time as data and technology allow further exploration, and as we welcome your feedback.

We hope you find this informative and we look forward to providing more. The team are on hand to explore data specific to your needs and situation.

Gareth Davies. CEO and Co-Founder.



A handwritten signature in black ink, appearing to read 'G. Davies'.

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Introduction

The culmination of another agricultural year, harvest 2023 was a stage set by factors like grain prices, fuel costs and the British weather.

We're seeing more frequent extreme weather, from periods of drought in some regions to widespread flooding. These external factors highlight the need to manage what we can control, and to mitigate risk in factors outside of our control.

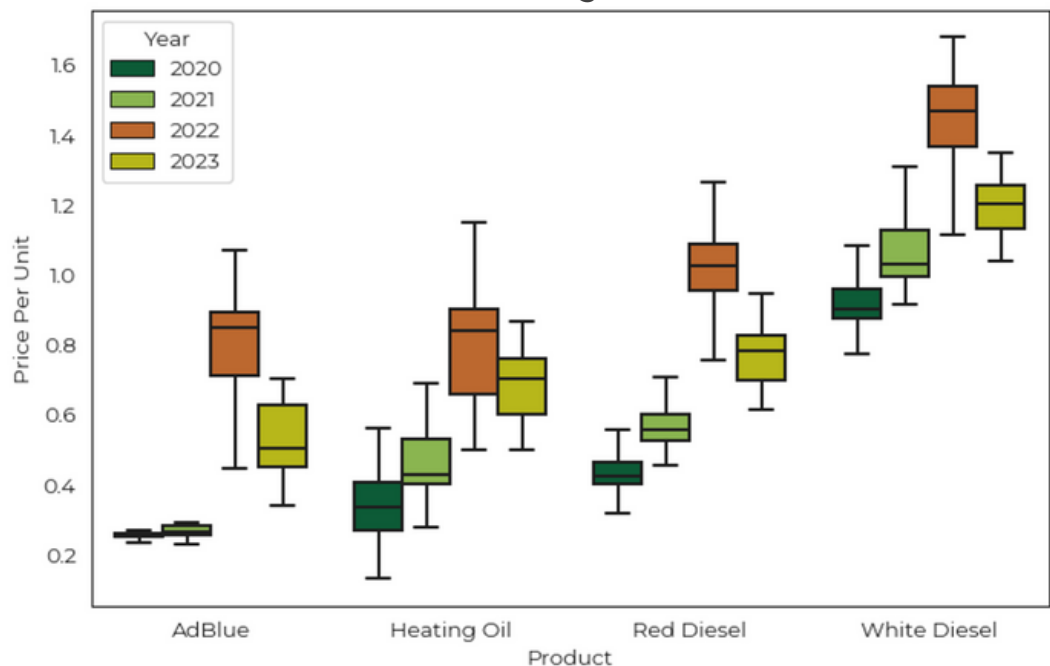
We are seeing a trend of farms contemplating resilience and climate mitigation across their agricultural practices. We're busy working with those farms to help use their data to provide answers to this challenge along with the range of other challenges farms are facing today .

Besides the weather, other challenges this year included the stark presence of Septoria and Blackgrass, causing many arable headaches. Oilseed Rape beat Barley to the combine in some parts of the UK, while lodging stood out as one more challenge facing growers.

FUEL

Our Data Team summarised average fuel spend per litre for this year. They found that average spends decreased slightly compared to 2022, with red diesel costs recorded on our platform lower by 25%.

Chart 1 - 4 Year Fuel Prices Ranges



When we look at the last 12 months (on the next page) of Red Diesel, there is significant volatility over the year with highs of 103ppl and lows of 63ppl - a 40ppl range. Whereas the previous year had an 80ppl range with highs of 148ppl and lows of 68ppl.

Therefore, although we are seeing an average price of just over 80ppl, for those with an eye on fuel markets, larger storage capacity and in some cases luck, fuel prices were significantly lower.

(All prices quoted above are delivered on farm price ex VAT from our MarketPlace.)

Chart 2 - Red Diesel 'on farm' fuel price Nov 2022 to Nov 2023

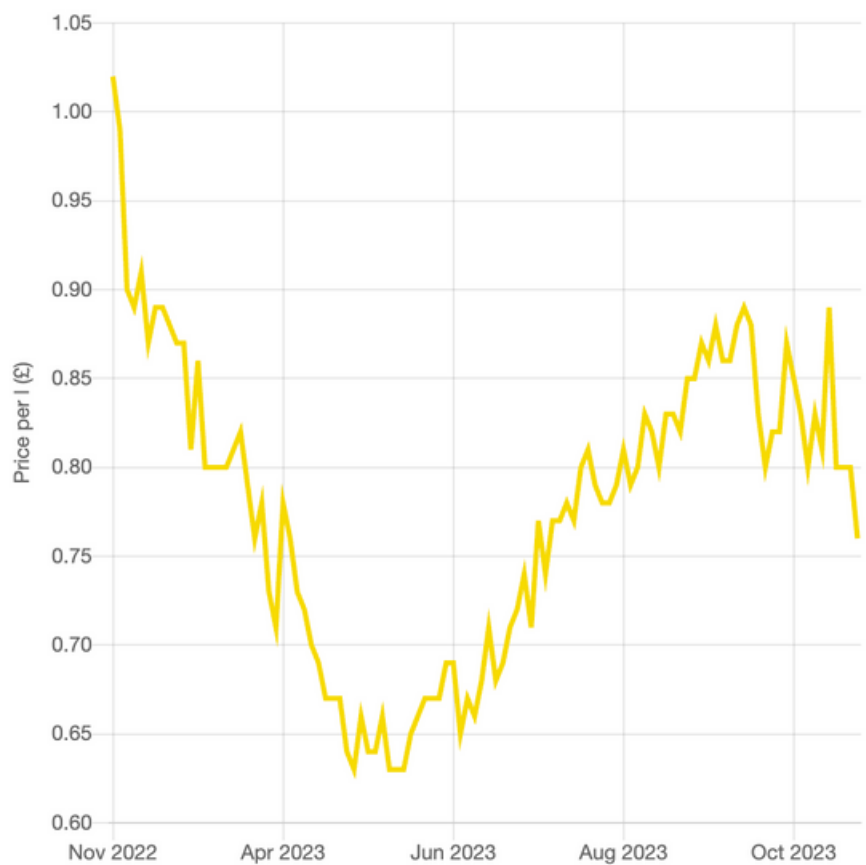


Chart 3 -Red Diesel 'on farm' fuel price Jan 2022 to Dec 2022



Variable Inputs

Compared to the recent decreases in fuel costs, the picture painted below is more concerning. Regarding variable input costs, the increase has been significant over the past 2 seasons. This is heavily skewed by fertiliser prices and is a consistent theme across the main crops analysed (Winter Wheat, Winter Barley, Spring Barley & OSR.)

See the graphs below displaying variable Costs of Production for these crops across the last few seasons, both £/ha and £/t.

Chart 4 - £/ha for Wheat (Winter) Over 5 Years

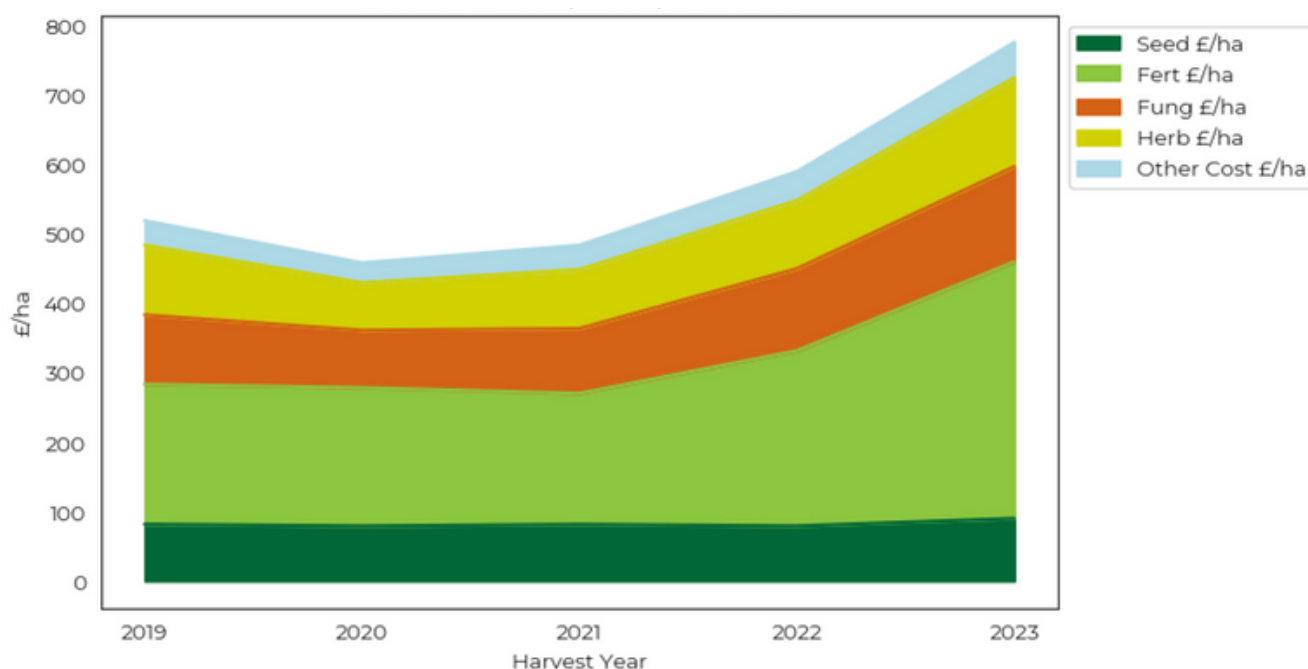


Chart 5 - £/t for Wheat (Winter) Over 5 Years

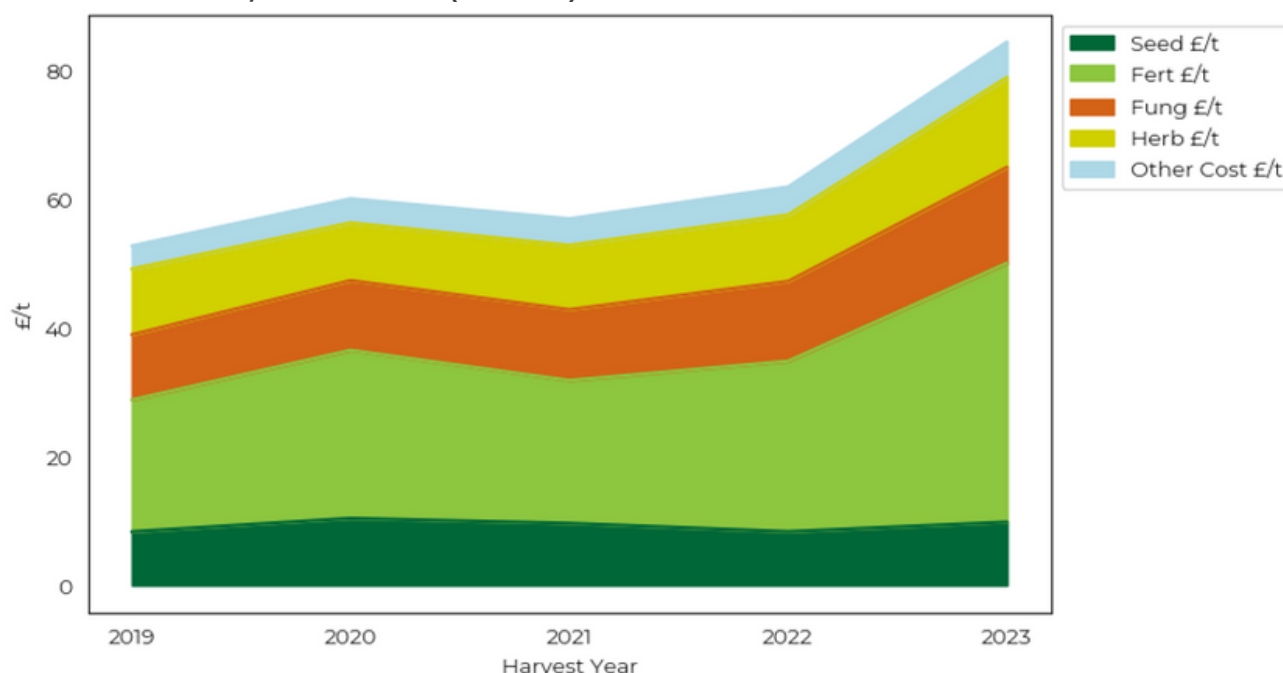


Chart 6 - £/ha for Barley (Winter) Over 5 Years

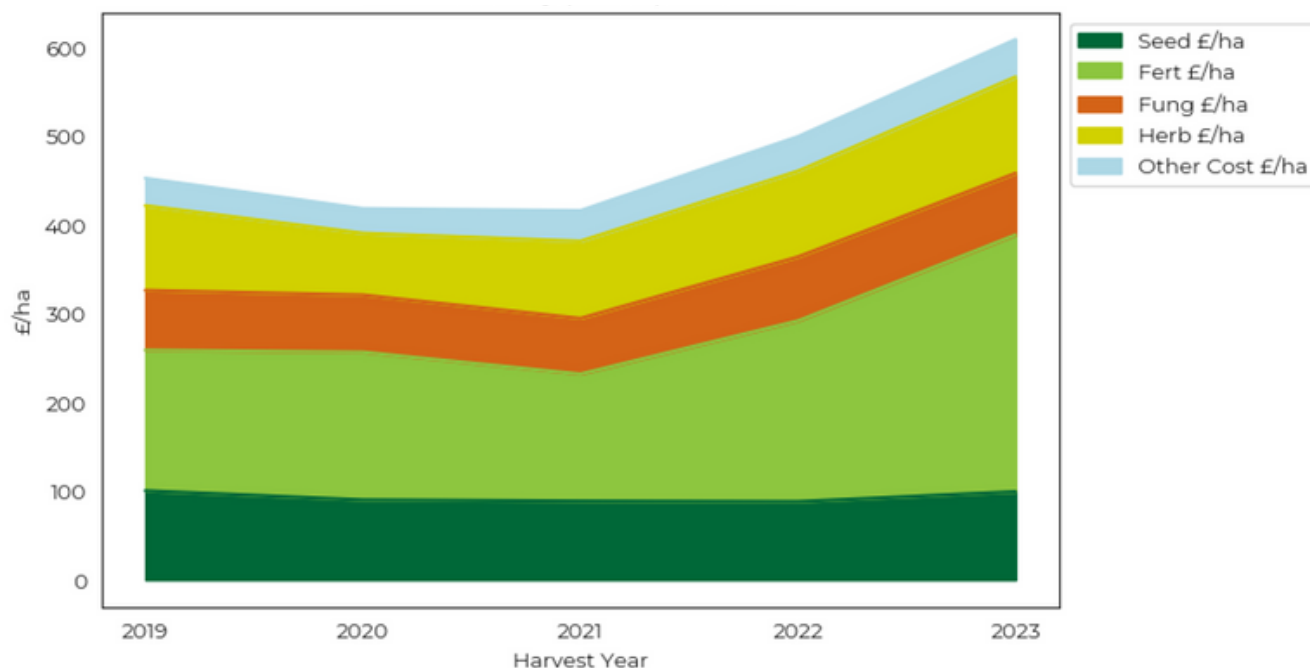
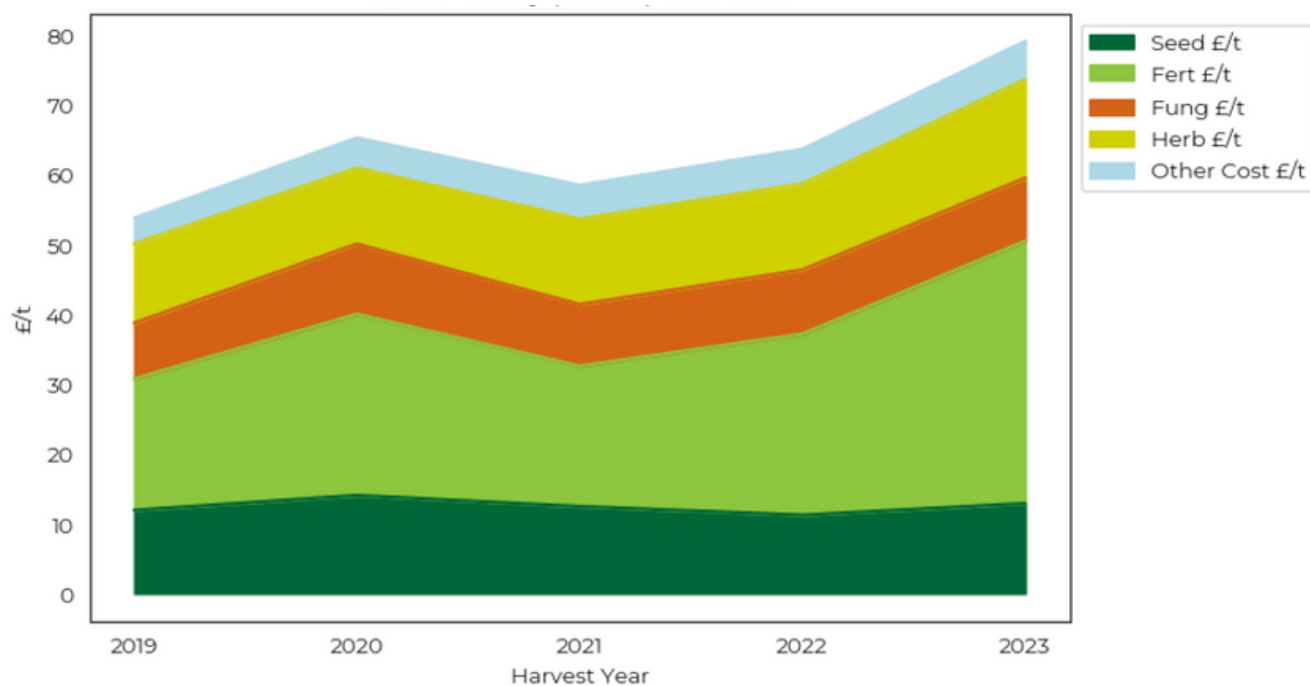


Chart 7 - £/t for Barley (Winter) Over 5 Years



Note: The 'other costs' featuring in these graphs comprise of additional inputs such as insecticides, biostimulants, adjuvants and growth regulators.

Chart 8 - £/ha for Barley (Spring) Over 5 Years

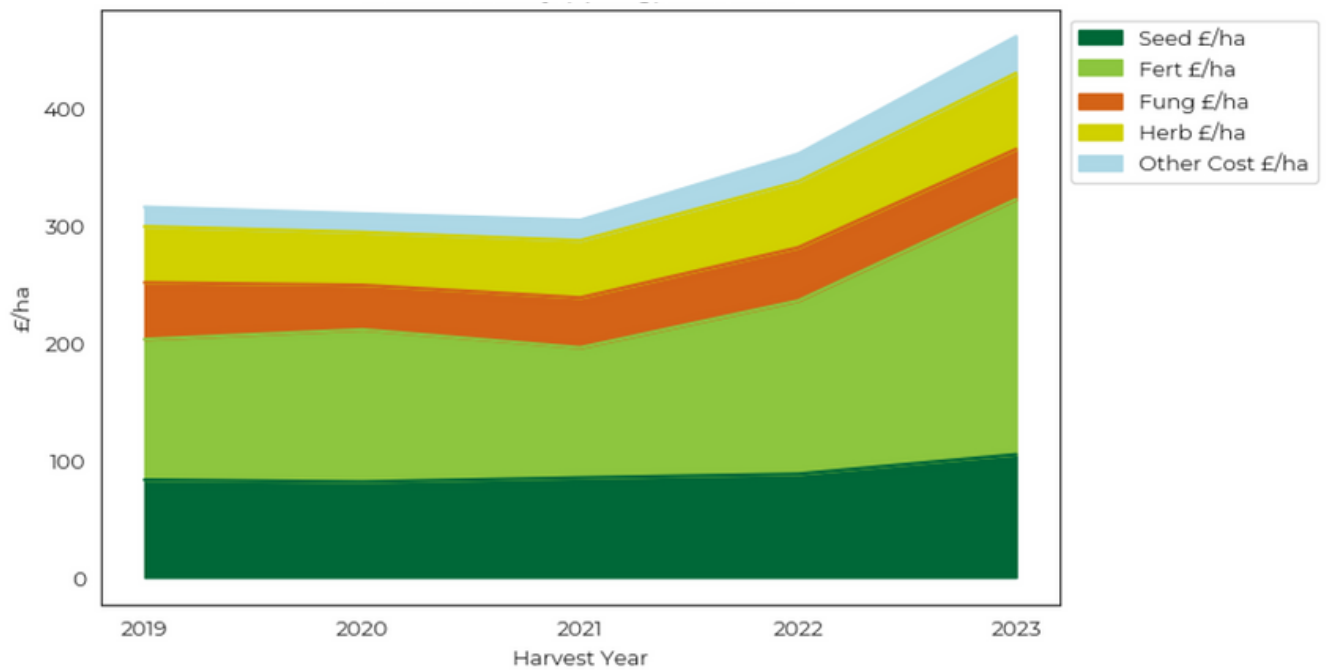


Chart 9 - £/t for Barley (Spring) Over 5 Years

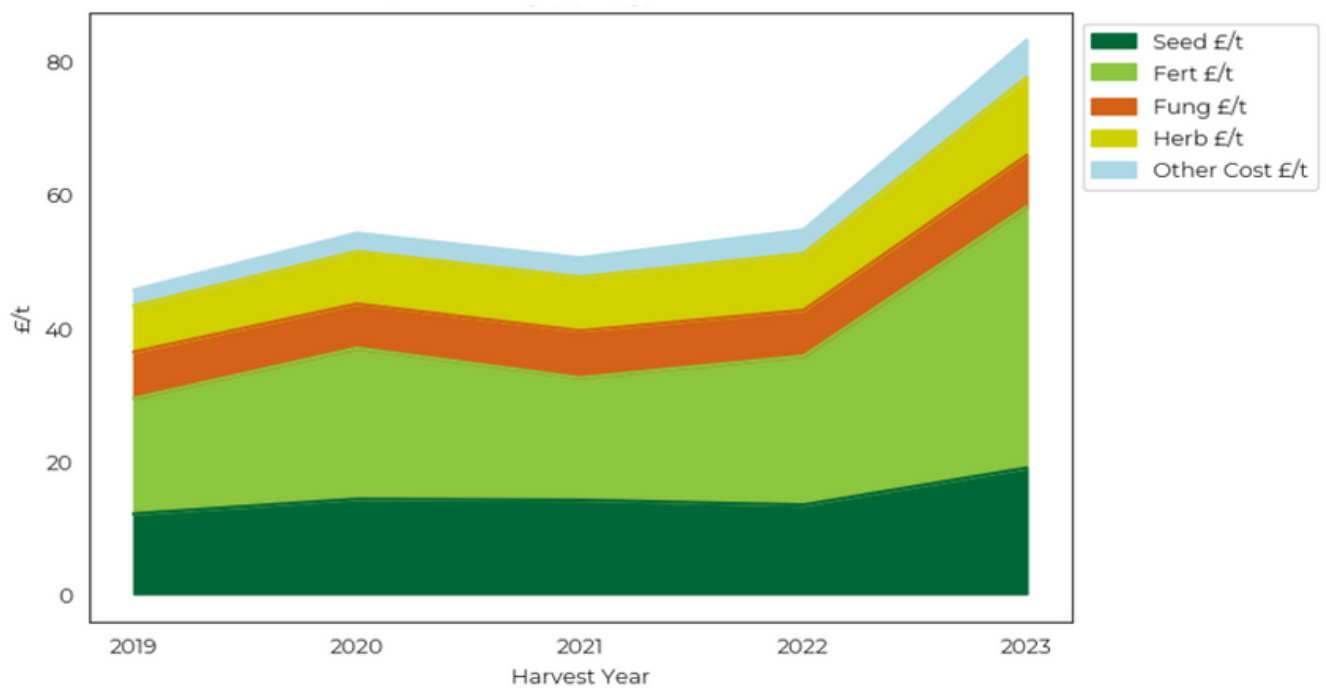


Chart 10 - £/ha for Oilseed Rape (Winter) Over 5 Years

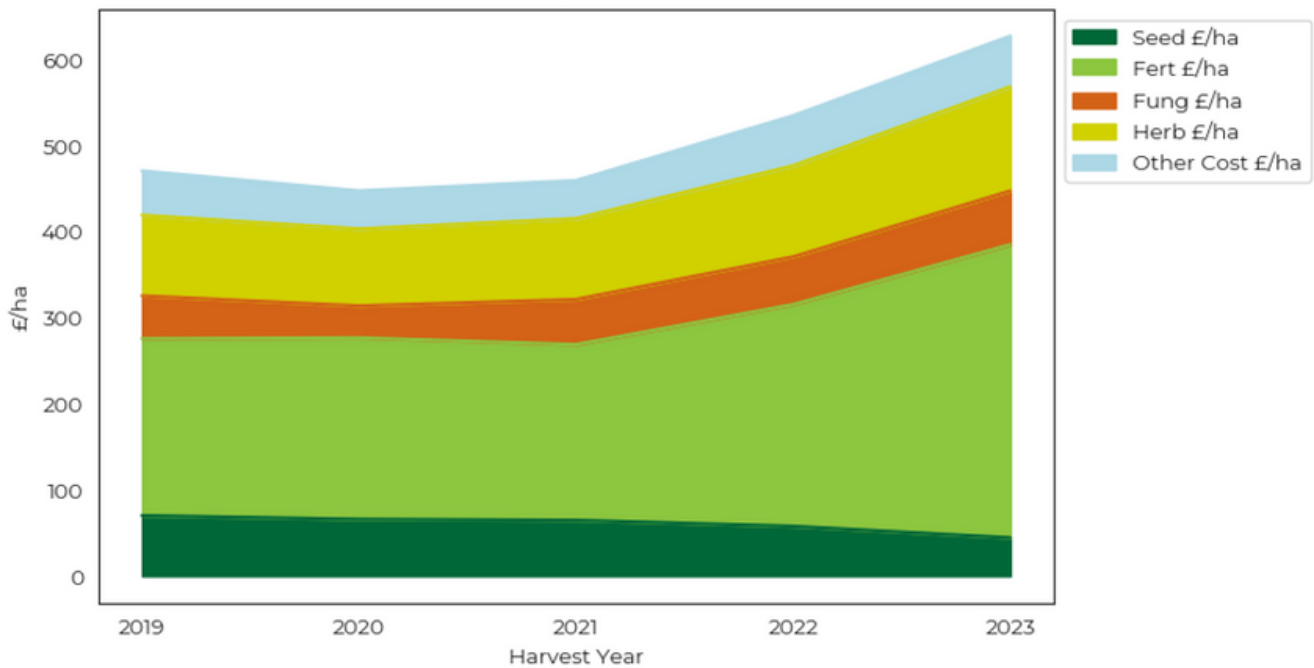
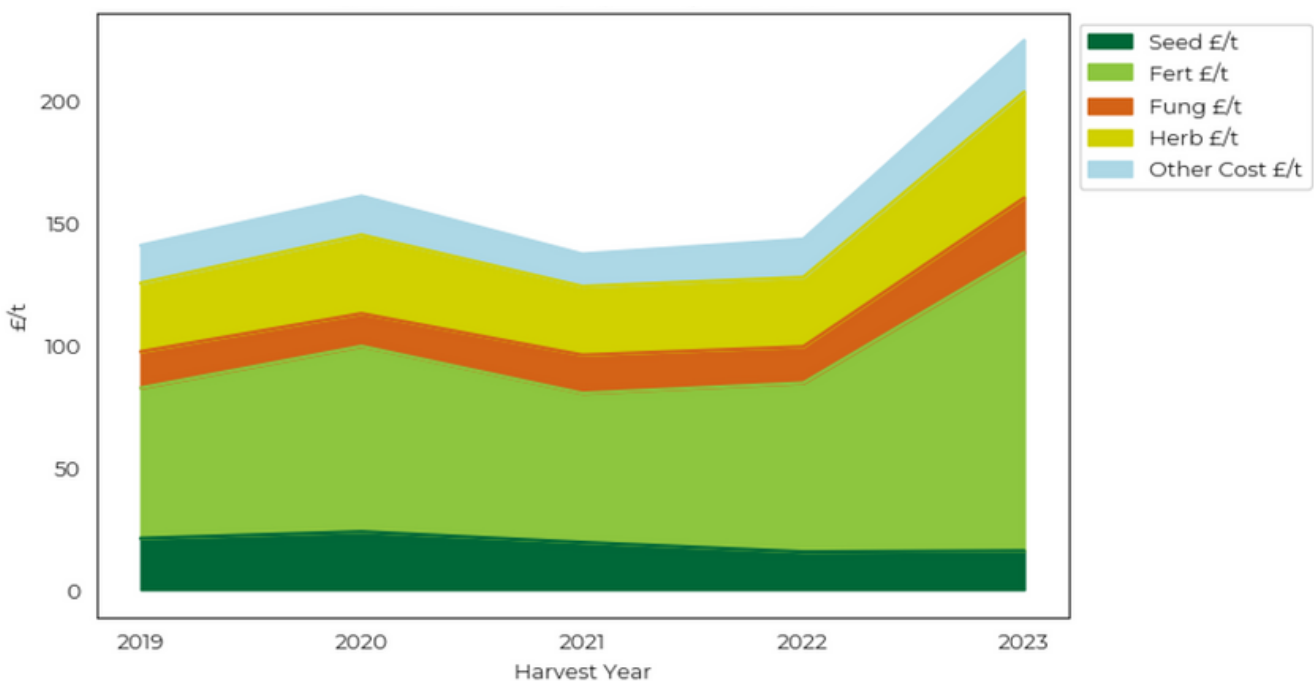


Chart 11 - £/t for Oilseed Rape (Winter) Over 5 Years

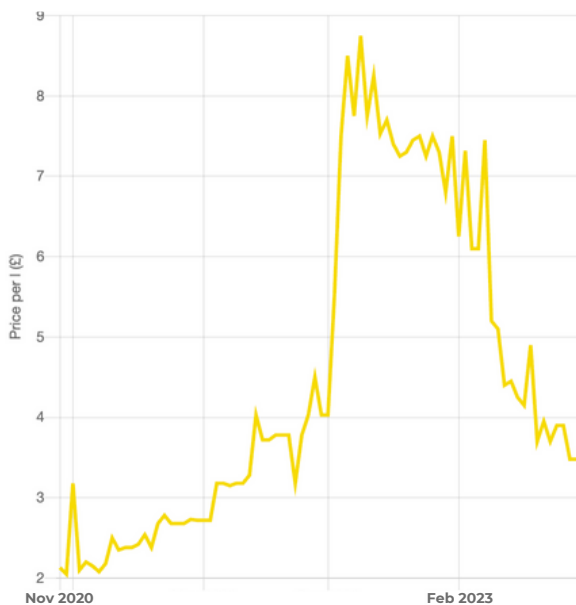


If you needed any further proof that growing crops is simply more expensive, look no further. The spike in the last two years has been felt by growers across the country, our customers included.

Particularly noticeable is the increase in costs per tonne of crop harvested vs the cost per hectare. Meaning every bushel you sell has cost you more to produce. Unfortunately, the price volatility in current end markets is a compounding factor also, which as experts in the grain markets we've asked CRM Agri to summarise on page 30.

Chemical and Fertiliser Inflation

Chart 12 - Rodeo 3 Year Price Chart



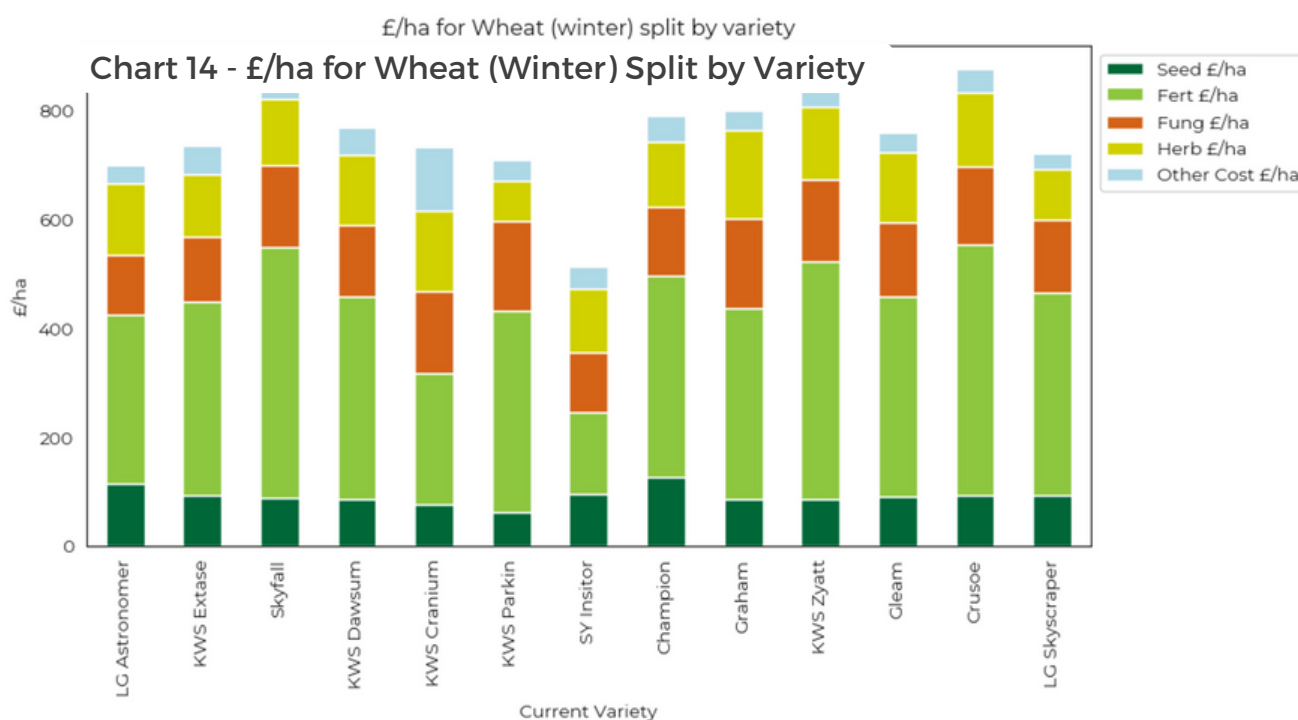


Varietal Data

Varietal Data (Costs) – Winter Wheat.

Continuing with variable costs (£/ha) in further detail, we have analysed crops by variety - as variety choice is a key decision our farming customers make.

Starting with Winter Wheat, our data shows that Crusoe and Skyfall received the highest fertiliser spend per hectare, both being Group 1.

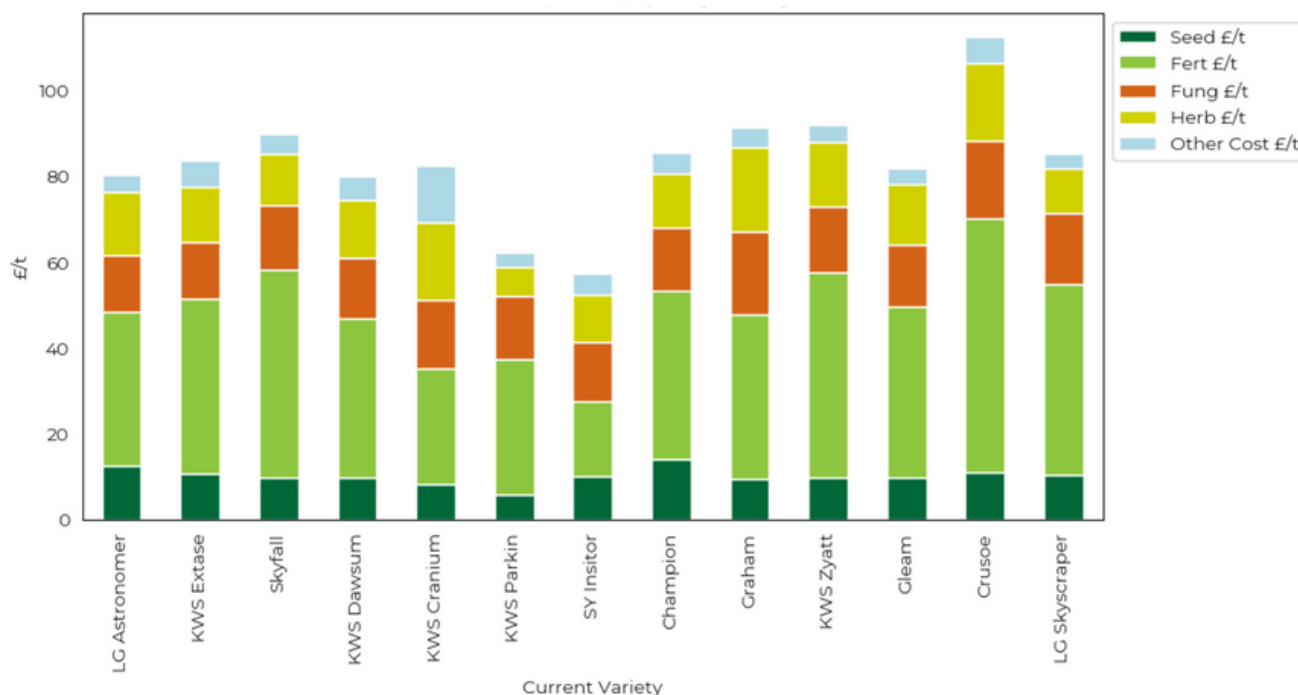


From data sets like these, we can provide our customers support around varietal choice. We understand that the needs & factors of each farm are different and strive to deliver insight and value through accurate data to inform decision making.



Here is the same dataset, but notably now analysed on a cost per tonne (£/t) basis.

Chart 15 - £/t for Wheat (Winter) Split by Variety



The data reveals an interesting COP £/t analysis of the two Group 4 varieties SY Insitor and Champion - with SY Insitor costing less (particularly in fertiliser) to produce a tonne come harvest.

Considering KWS Zyatt, the COP £/ha was similar to Crusoe, however the £/t is lower. This could be due to a range of factors, but largely indicates that it yielded well and offers a good return on investment for growers.

Another factor when deciding on varieties is of course end market grouping – so we analysed the variable COP by groups, shown on page 17.



How Boxplots Represent Data

We understand the value that data holds when presented well and used in the right manner.

Boxplots provide clarity and are visually quick to digest.

The boxplot is made up of the 'box' displaying the 25% to 75% of the market range, split into two parts to show the 50% 'median'. The 'whiskers' show the top and bottom ranges of the data. These ranges can be skewed, with median lines higher or lower within the box, and shorter or longer whiskers to represent the range of data.

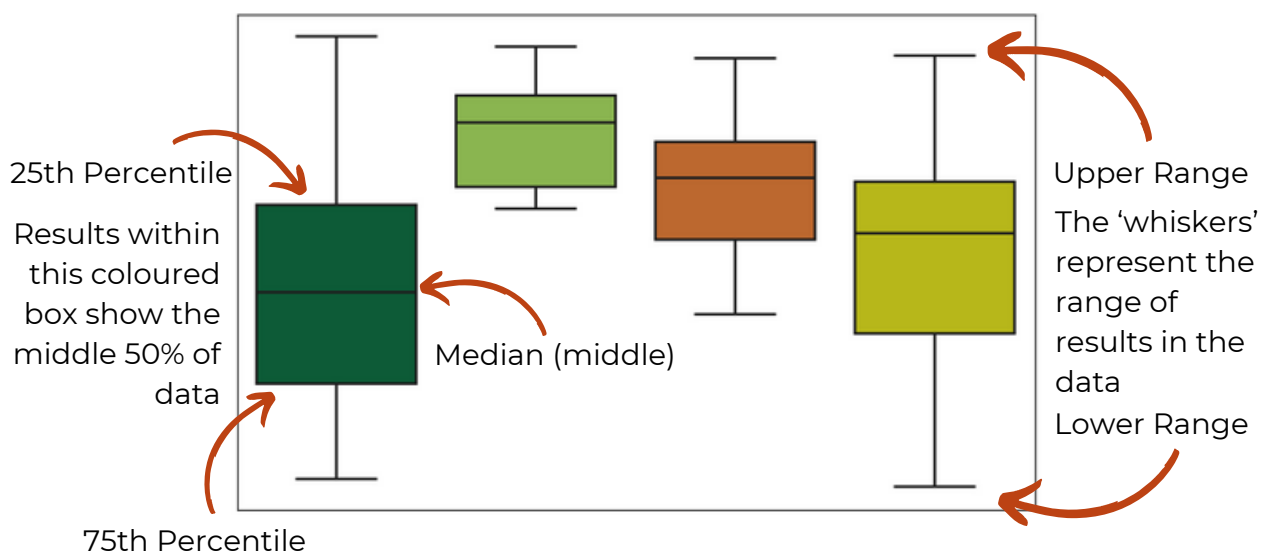


Chart 16 - Variable Input Costs £/ha for Wheat (Winter) Split by Group

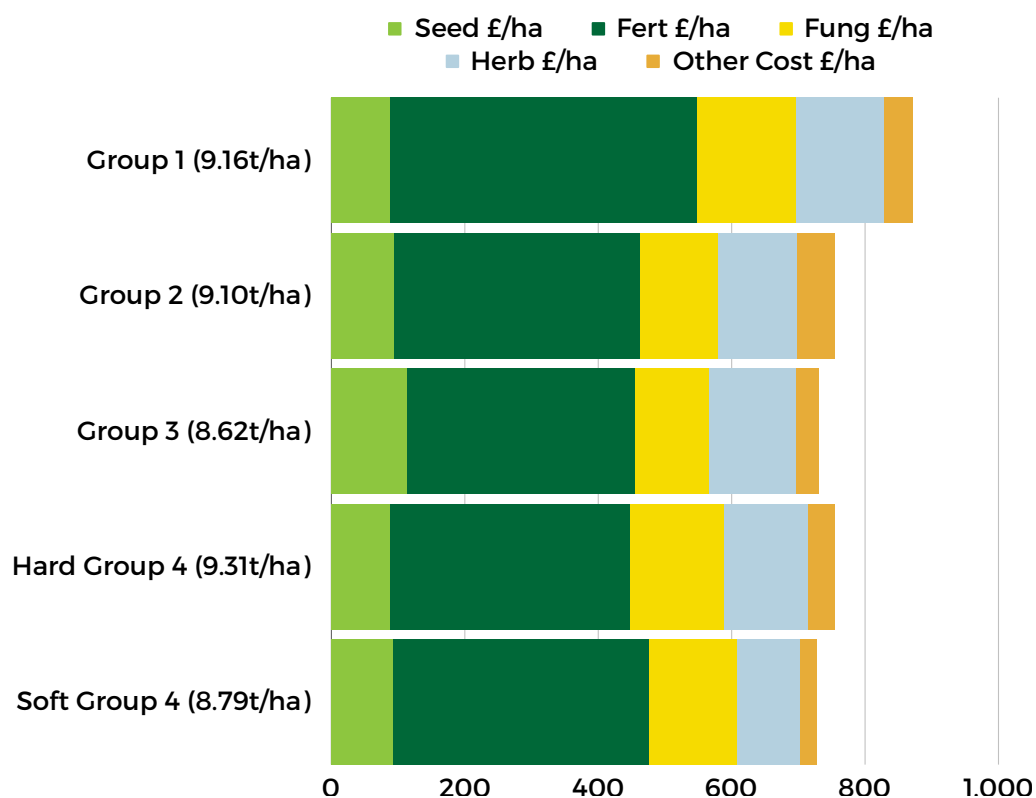
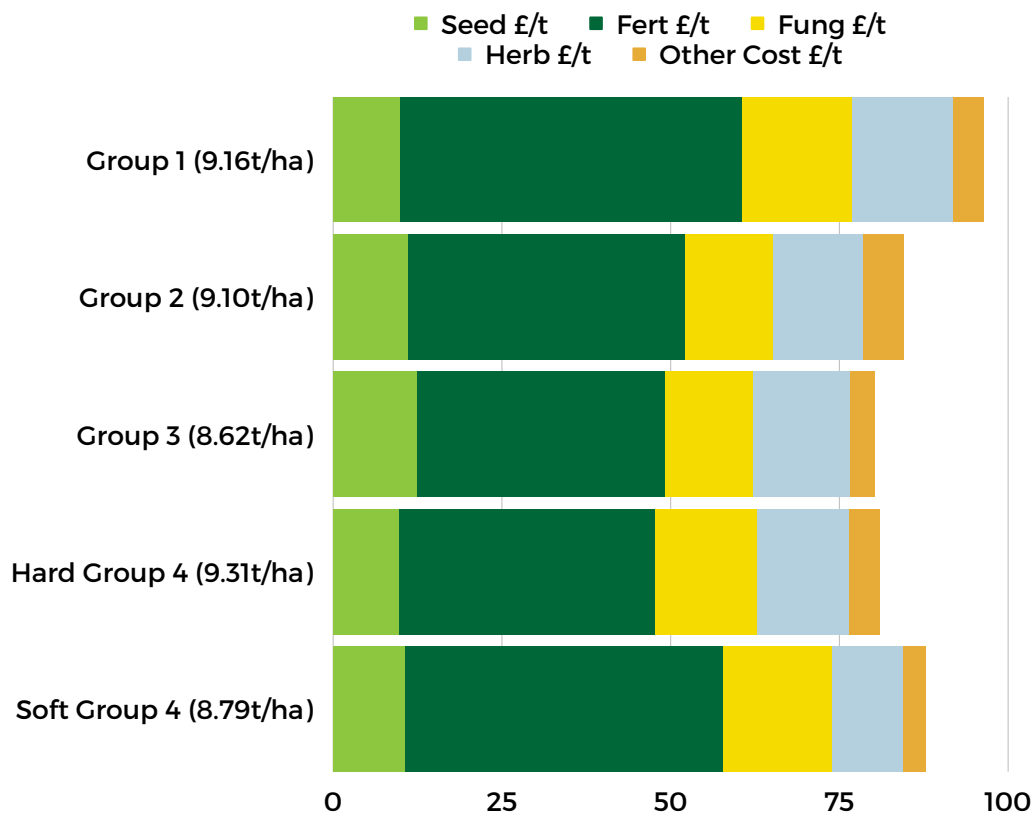


Chart 17 - Variable Input Costs £/t for Wheat (Winter) Split by Group



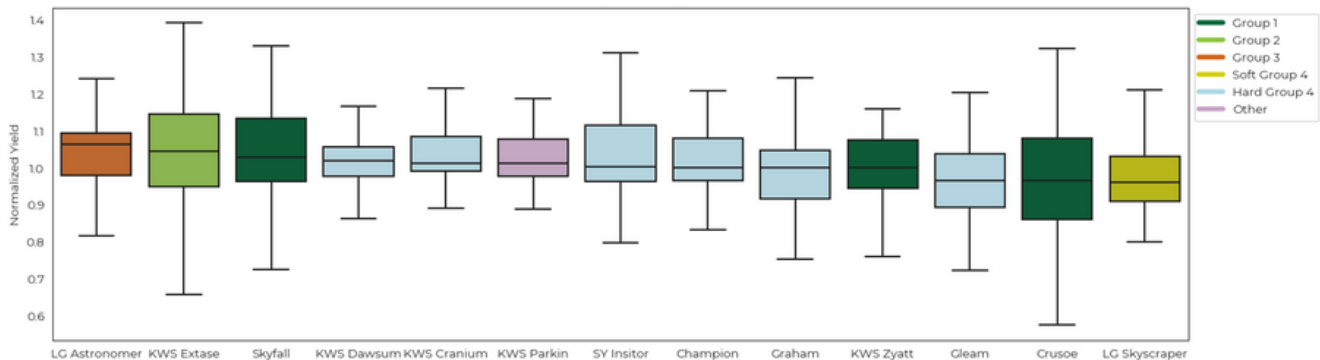
Varietal Data (Yields) - Winter Wheat.

The arable industry adage ‘yield is king’ still resonates, although perhaps less so going forwards as the landscape and priorities shift with changing policies. We believe this outdated adage needs to change to ‘efficiency is king.’

Although we analyse yield as a source of comparison, we focus on the more relevant ‘Cost of Production per tonne’ and ‘gross margin’ of each crop.

That said, since production remains at the core of our farming community, below we are displaying the yield ranges of the most grown Winter Wheat varieties on our platform.

Chart 18 - Normalised Yield for Wheat (Winter) by Variety, Coloured by End-Use Group



Note: These are scored on normalised yields to account for farm variables and ranked from highest to lowest (left to right.) Scoring mimics the RL/NL scoring system, with an average yield of 1.0, with scores above and below respectively. (For example, the lower end of Gleam reaches 0.8 – 80% of average yield. Whereas the highest outliers for Gleam reached 1.2- 120% of average yield.)

KWS Extase stands out with the highest recorded yield of 14.2 t/ha from our datasets, but has outliers at the lower end of the spectrum also. Many commentators continue to attribute the ongoing success of KWS Extase to its strong Septoria resistance.

LG Astronomer achieved an average yield around 11.5 t/ha, however it’s consistency across all farm variables (weather, soil type, etc) landed it at the top of our Normalised Yields. It performed well across our platform with few outliers, achieving on average 10% higher yield than LG Skyscraper.

What does your farm data say about yield variation? With so many factors outside of your control, you have the chance to mitigate risk by using your farm data to review yield spreads at a crop, variety and field level. This is a topic we explored in our data story on intra-farm variation (read on page number 33.)

These Proportional charts show the cost per hectare (and cost per tonne on the next page) of the variable inputs of the core Wheat crops we've seen in 2023.

The graphic gives a visual of the relative sized values £/ha and £/t for each variety.

Chart 19 - Proportional £/ha for key Winter Wheat Varieties



Chart 20 - Proportional £/t for key Winter Wheat Varieties

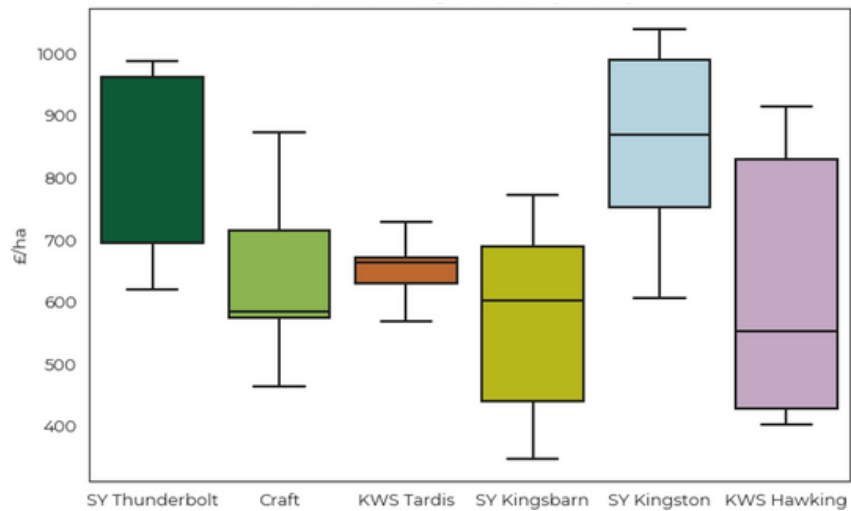




Varietal Data (Costs) – Winter Barley

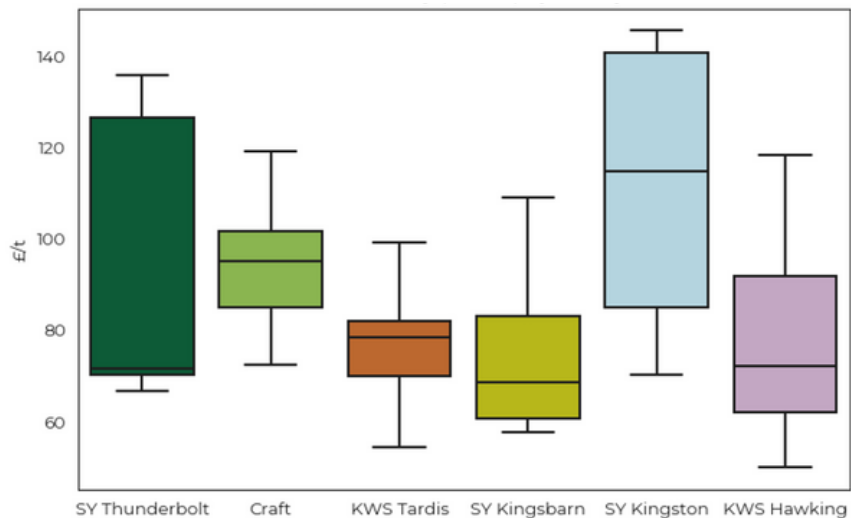
We're representing the core Winter Barley varieties' variable costs using boxplots as this offers the central median value, plus the 25% and 75% percentiles which comprise the coloured box – also displaying the ranges by the whiskers.

Chart 21 - £/ha for Barley (Winter) by Variety



The small space taken by KWS Tardis represents the consistency of costs associated across our platform, with all the fields analysed receiving roughly the same variable costs for this variety. SY Kingston and KWS Hawking, on the other hand, saw greater variations - with SY Kingston receiving the highest £/ha overall.

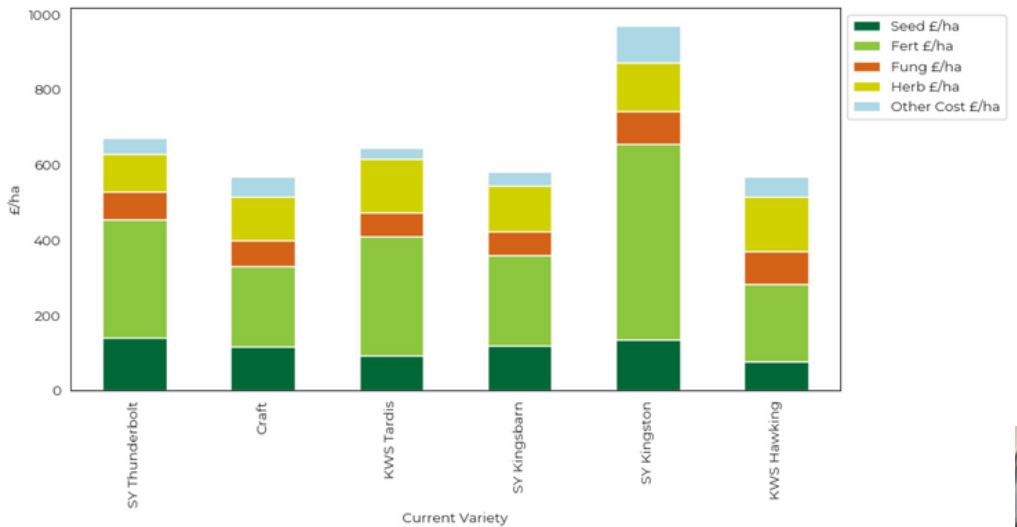
Chart 22 - £/t for Barley (Winter) by Variety



On a £/t basis SY Kingston, a six-row feed variety, remains at the top of the variable costs when compared with other Winter Barley varieties. KWS Hawking recovered at harvest from a high £/ha variable input cost by yielding well and landing a low £/t.

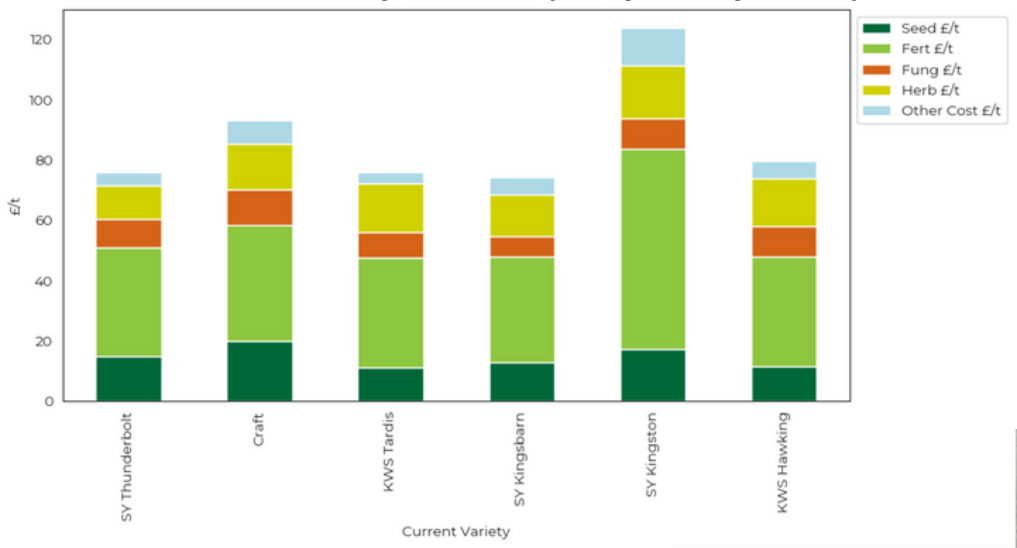
We break those costs down again into constituent parts, below:

Chart 23 - £/ha for Barley (Winter) Split by Variety and Input

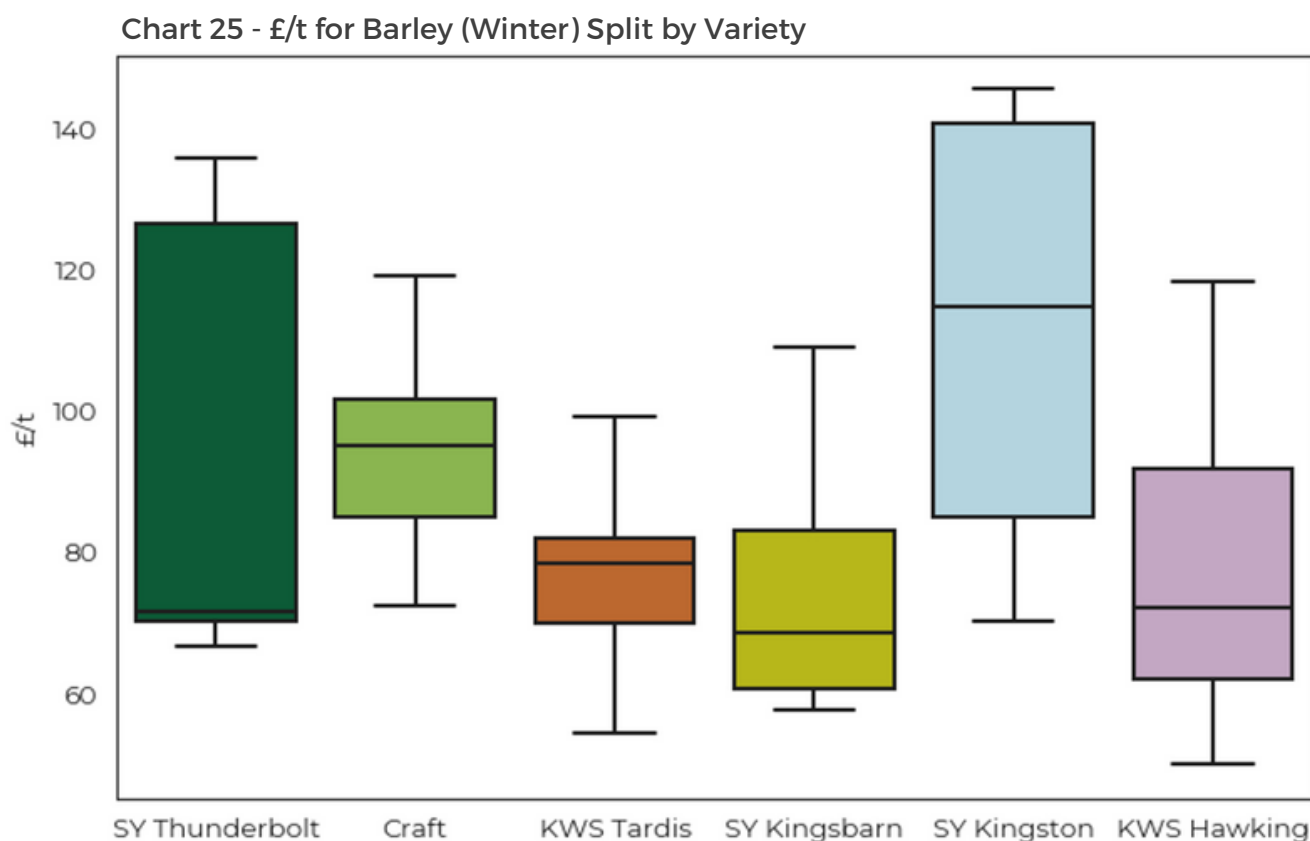


As often seen with variable costs, the main driver in Winter Barley production is fertiliser. SY Kingston received 115% higher fertiliser costs than SY Kingsbarn on a cost per hectare basis, despite both being six-row feed varieties.

Chart 24 - £/t for Barley (Winter) Split by Variety and Input



Varietal Data (Yields) Winter Barley



SY Kingsbarn catches the eye when analysing the yield (t/ha) having the highest recorded outlying yields. Cross referencing this dataset with the previous variable Costs of Production (£/t and £/ha) and the data tells a positive story, with low input costs and high potential yield.

SY Kingston, despite the highest £/ha variable costs, yielded lower than most other varieties we analysed.

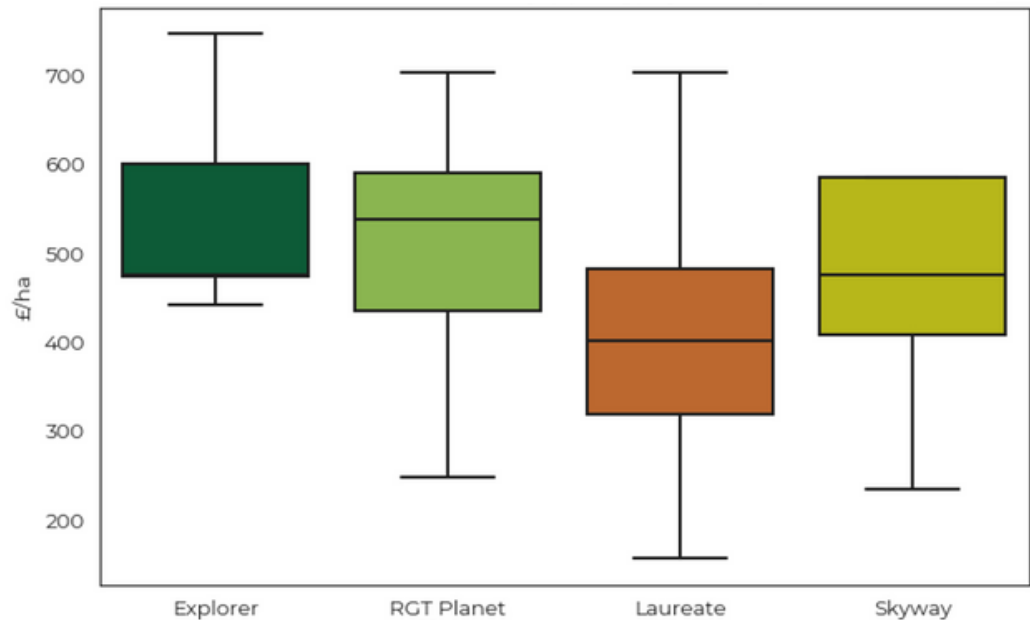




Varietal Data (Costs) Spring Barley

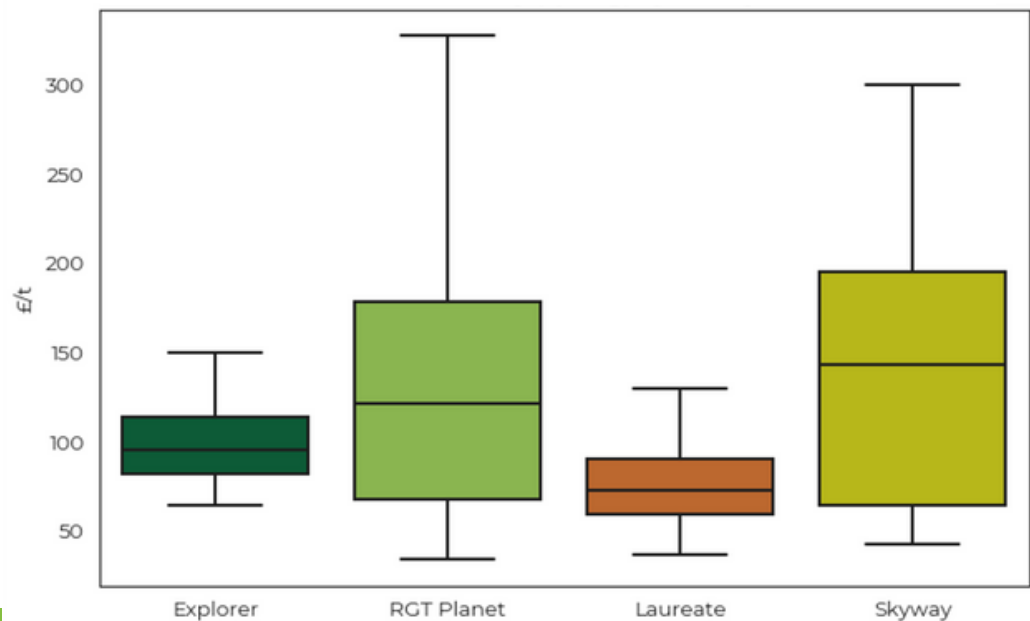
There are many reasons why growers, our customers included, are weighing whether to continue Autumn drilling or switch to Spring and assessing the benefits of both. Depending on your region, the foremost could be blackgrass, weather or difficulties turning ground around.

Chart 26 - £/ha for Barley (Spring) Variety Range



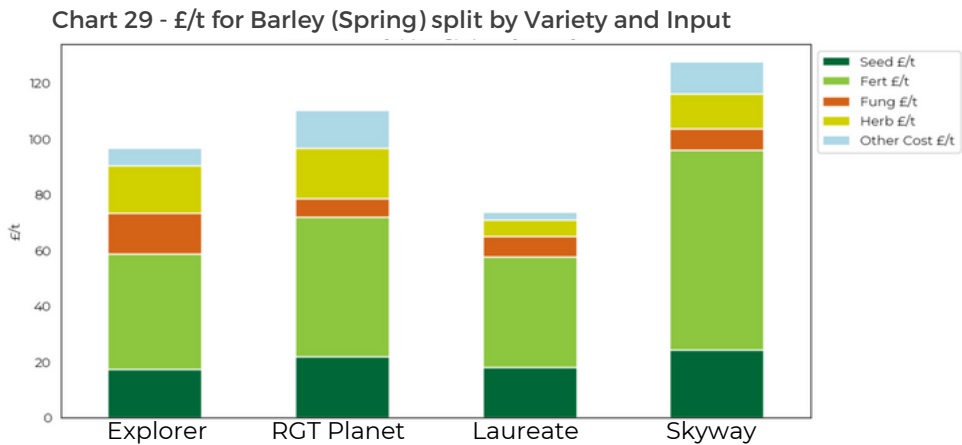
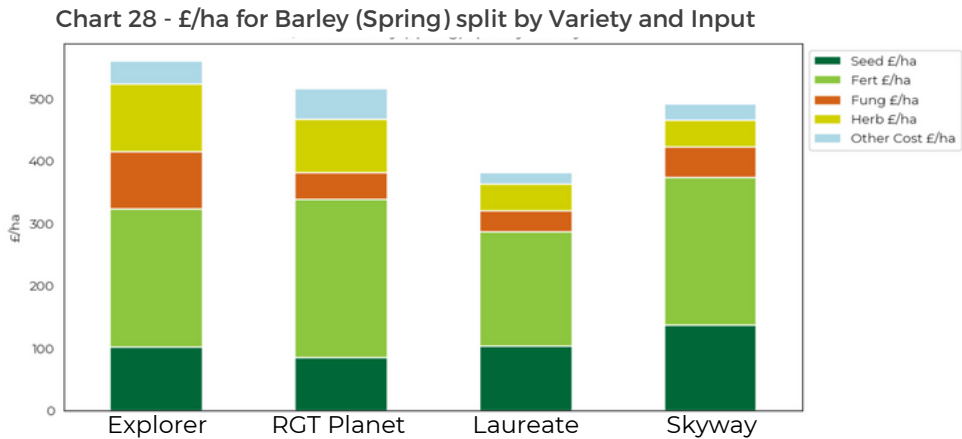
Naturally, the differing cycles between Winter & Spring sown crop effects the variable Costs of Production, with Spring crops receiving lower inputs during their shorter tenure in the soil. The standout Spring Barley variety on our platform was Laureate with the lowest average £/ha COP (25% lower than RGT Planet.)

Chart 27 - £/t for Barley (Spring) Variety Range

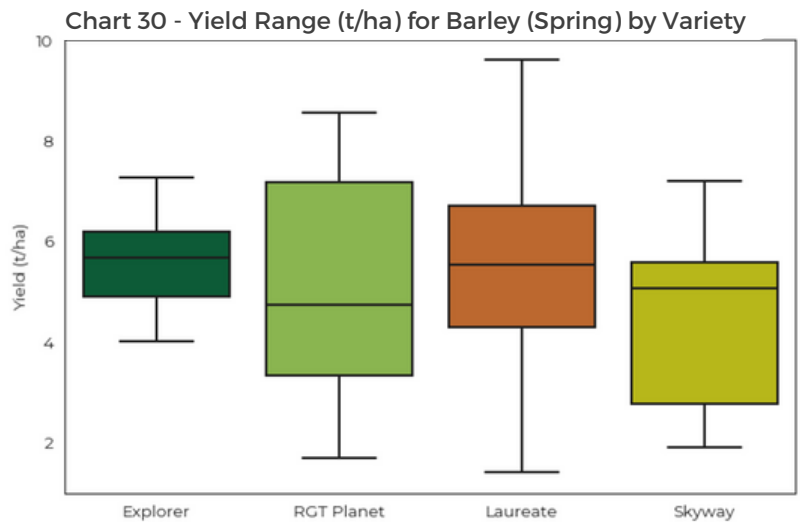


Comparing costs per hectare and per tonne is always a revealing exercise. With Explorer receiving the highest variable costs per hectare (£/ha) it seems a simple conclusion to draw that Explorer is a high-cost variety to grow. However, the cost per tonne (£/t) redeems this notion, showing that its output at harvest makes it a solid year-round investment in the rotation.

And breaking these costs down into constituent parts...



Varietal Data (Yields) Spring Barley

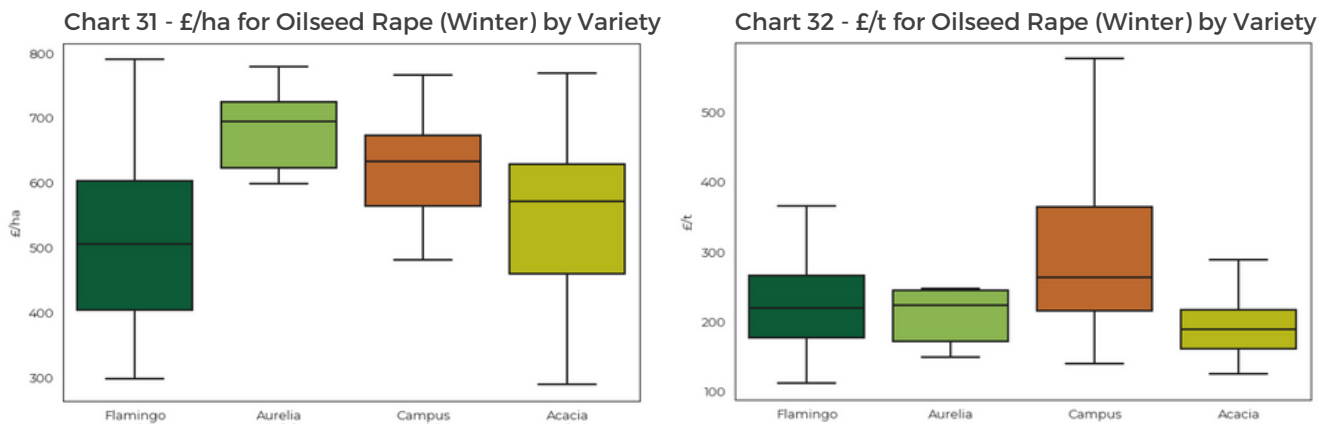


Laureate, despite having the lowest variable Cost of Production (both £/t and £/ha) returns competitively with yield.



Varietal Data (Costs) – OSR

The viability of growing Oilseed Rape is an ongoing discussion across the UK arable industry, not least due to the threat of Cabbage Stem Flea Beetle looming large each year. Regardless, a brassica break-crop with the potential for good market prices continues to deliver yellow fields on the horizon each Spring.



The variety Aurelia received 37% higher £/ha COP compared to Flamingo, but once again the £/t post-harvest data offers redeeming value – only 2% higher than Flamingo per tonne on average, with a tighter range (below.)

Breaking variable costs down further, you can see (below) that Flamingo and Aurelia are performing with Fungicide only comprising a small portion of spend.

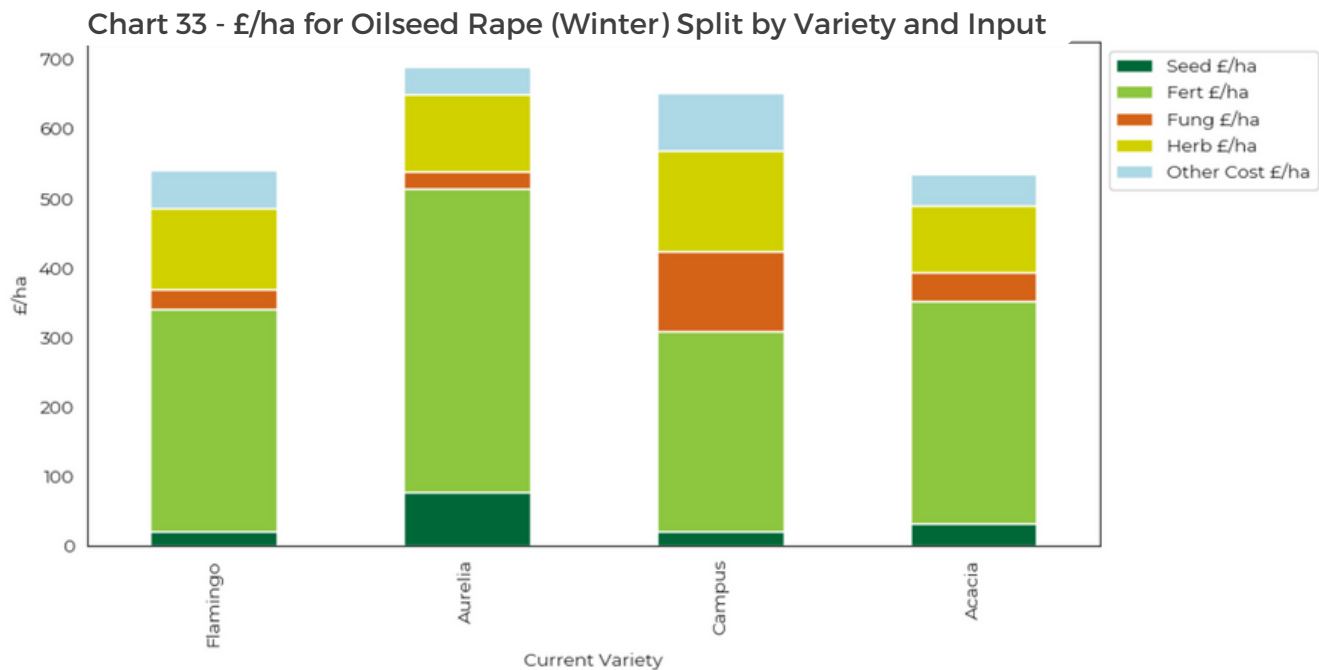
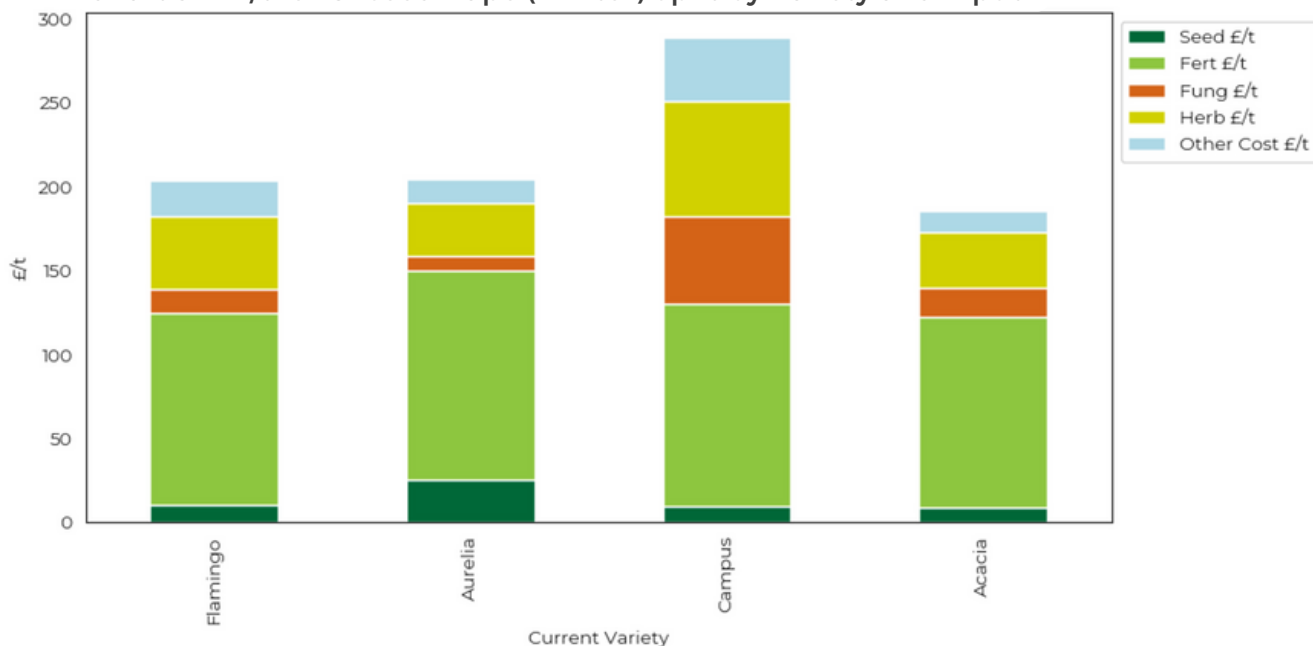
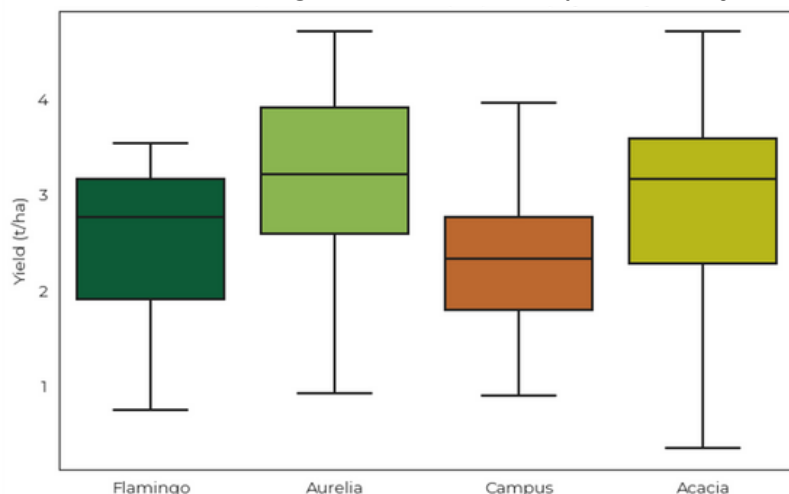


Chart 34 - £/t for Oilseed Rape (Winter) Split by Variety and Input



Varietal Data (Yields) - OSR

Chart 35 - Yield Range (t/ha) for Oilseed Rape (Winter) by Variety



The data highlights Acacia's lower cost per hectare and cost per tonne compared to its peers, alongside a much broader-ranging yield potential.

Also, the data shows a significantly higher chemical spend on Campus, yet an average yield return compared to the other varieties in this report.



Grain Marketing

Having reviewed variable Costs of Production for core UK cropping, another key area where data can have a profound effect is grain marketing. We developed our Tracker tool to help budget, manage and measure in-season sales prices.

James Bolesworth, Founder of CRM Agri, a leading provider of insights and a go to source for grain market intelligence rounds up the past season and looks at selling for the season ahead.



Markets have never been as volatile as was seen in the 2022 harvest marketing year. Wheat prices were around £275/t when farmers were planting the 2023 crop, an unbelievable change of fortunes from plantings the previous year where wheat prices were trading around £185/t at plantings. Today, wheat prices are trading around £200/t for May-24.

The unprecedented volatility was driven initially by the supply chain disruptions from Covid-19 and when the world began the 'unlock', a surge in demand stretched supply chains to breaking point.

The 2022 season saw prices above £350/t recorded, which very few would ever have considered a possibility prior to two of the world's largest producers and exporters of grains including wheat and corn going to war with each other. Prices of grain, energy and fertiliser soared, and with it global inflation and higher interest rates as central banks moved to curb the price increases around the world. The loose monetary policy which had supported investors to buy grains in the previous season began to tighten quickly, sucking capital out of grain markets and adding to the pressure of bigger crops and a surprisingly effective grain corridor facilitated by the UN to move grain out of war-torn Ukraine.

Markets are now weighing up the bearish factors causing price pressure - aggressive Russian wheat exports and increasing corn yields in the US, Ukraine and Russia - with the increasing Geopolitical risk in the Middle East which have the potential to drive oil prices sharply higher and grain prices with them. Furthermore, there is still no meaningful alternative to the Grain Corridor and Russia continues to attack export facilities in Ukraine.

One thing looks certain, prices remain volatile and input price risks are higher. Farmers should be looking at margins closely for 2024 harvest and ensuring price rallies are seen as opportunities to take risk off the table rather than speculate the prices will return to their peaks. Without the price support from the wider investment community, prices will be unable to reach those lofty heights, and with interest rates widely expected to remain 'higher for longer', we can expect investors to remain on the sidelines for some time yet.

Chart 36 - CRM Agri 5 Year ICE Feed Wheat Price

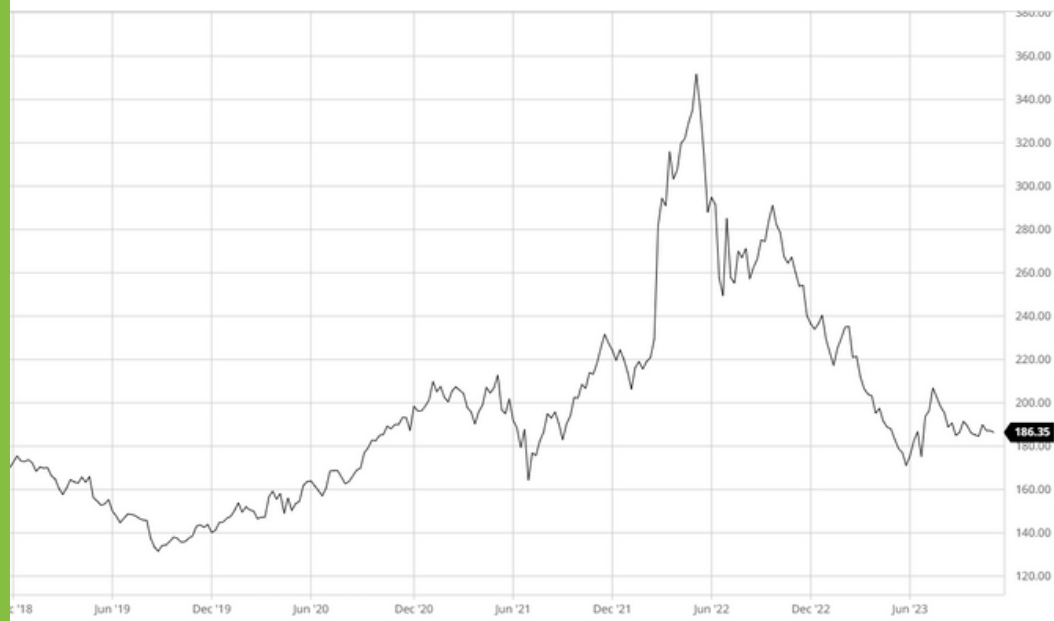
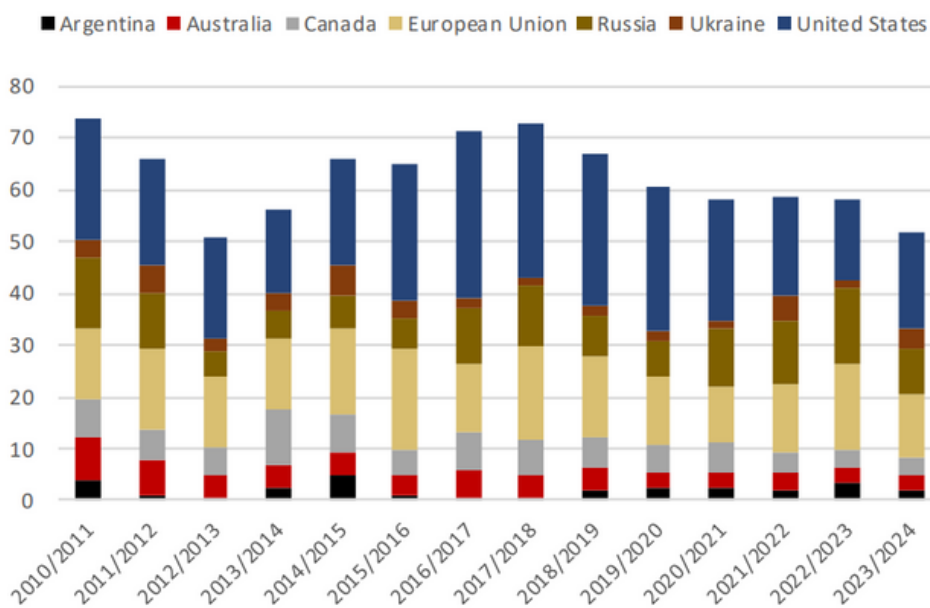


Chart 37 - CRM Agri USDA Major Exporter Ending Stocks Mt -



Leading Conversations

In addition to having wellies on the ground and analysts at desks - we've been publishing articles regularly discussing all things farm data. A series showcasing the value of [data-led decisions](#) has been a regular feature, including insights on how farm data can help [mitigate risk](#) and drive [growth](#).

(If you are reading a hard copy of this, please use the QR code at the end of this report to access a PDF version with accessible links.)

We've also been speaking to arable farmers about their experiences with the YAGRO platform ([Fridays Ltd](#)), and to MarketPlace customers who have found enormous value in our fuel distribution services ([Nolan Fuel Oils](#).) Our CEO Gareth Davies also picked up his pen, writing an article discussing today's [AgriTech landscape](#).

However, as your trusted data experts, it's no surprise that we've spent a lot of our energy on the data itself. Our in-house team of agricultural data experts compile meaningful statistics, creating stories and visualising trends for our farming community to digest.



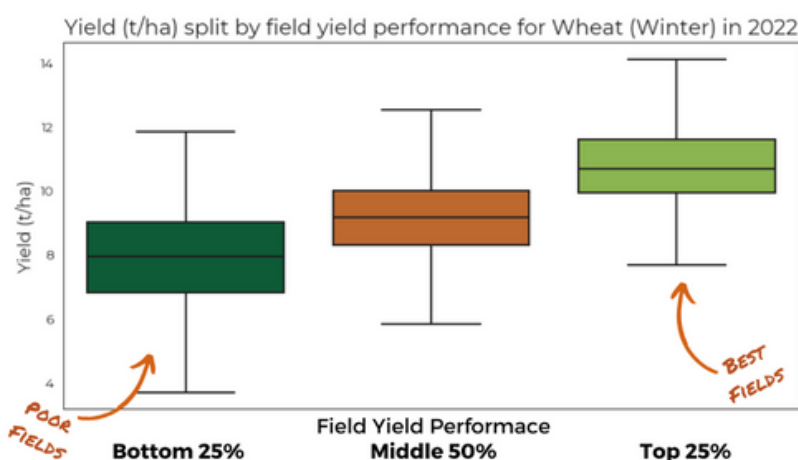
Glancing Back at Exploring Intra-farm Variation in 2022

Farms experience many variables that set them apart and affect their performance. The most discussed variable is of course the weather, which dictates an agricultural operation. Others include soil quality & type and topography.

However, even within a single farm operation, field level variables are present which are reflected in the productivity of each individual field.

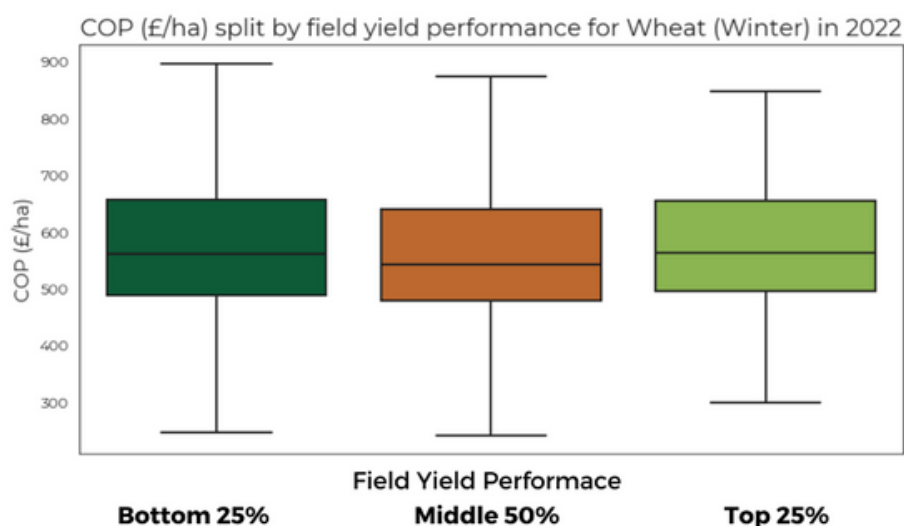
With the emergence of many SFI schemes and the continuing declination of BPS, it is increasingly important to understand your farm performance in as much granular detail as possible – including the exact value and productivity of each of your fields. This empowers your decision-making when it comes to efficient allocation of your land.

This first graph represents the average differences in yield performance across single farm sites. We split the results into three sections for visibility: top and bottom 25% of fields, with the remaining 50% in the middle.

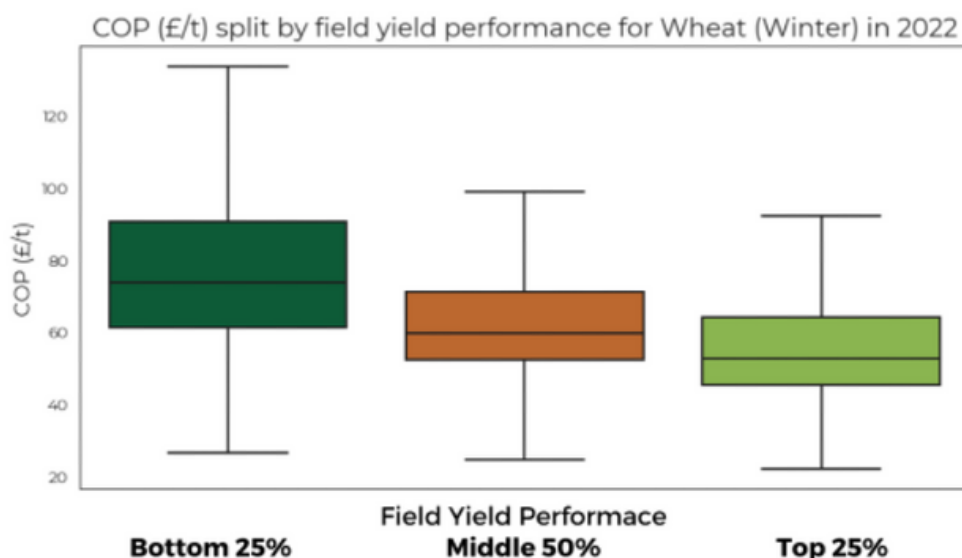


This shows the significant spread in yields taking place. On average – top fields are producing 3.04t higher yields than the least productive. There is a 10 tonne gap between the very poorest and very highest results, in some cases that equates to half productivity.

I'm sure you can picture a field in your operation that you believe performs better or worse than the others? But having the verified data proves or disproves that assumption and therefore helps to justify a decision on how best to take it forwards.



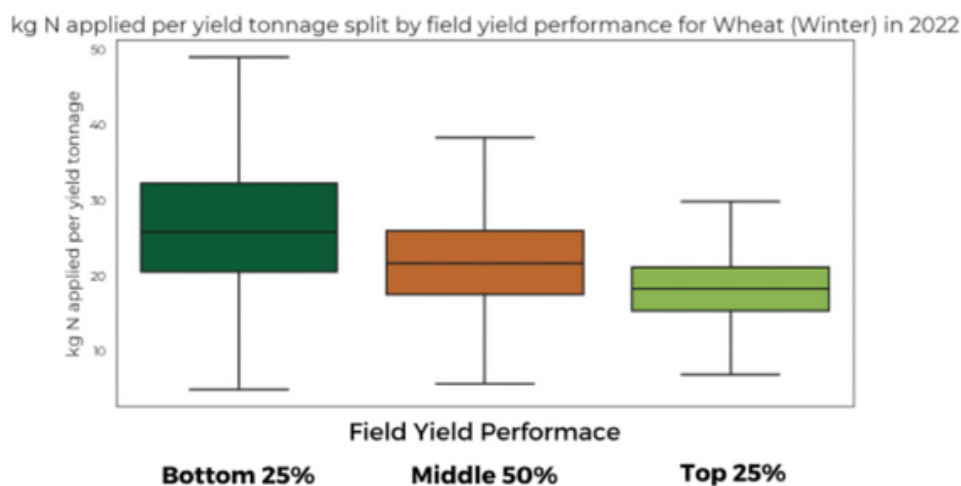
Representing Cost of Production per Hectare, we see here costs are relatively flat regarding inputs. Although, as the graph reveals, farmers are more likely to sink slightly more funds into their poorer performing fields.



Regarding Cost of Production, this graph is where the story comes to life. When analysing COP £/t it is evident that producing crop in the bottom 25% of fields, based on performance, is on average costing £25.20/t more than the top performing fields. With the potential for even greater variation.

This means if two 20ha fields are averaging 9t yields (= 180t per field) then the poorer performing field has cost an additional £4'536 to take to harvest. One of the reasons for this increase in cost is visualised in the following graph.

If you could easily and accurately visualise your average Cost of Production at this field level, and the differences between your fields, would it affect your decision-making process?



This final graph visually displays the differences in applied Nitrogen per tonne of Wheat harvested across different performing fields. The picture painted is clear – poorer performing fields are using on average 9.65kg more Nitrogen per tonne of Wheat harvested.

Use your field level data to understand which fields are driving you forwards, and which are holding you back.

We discuss data topics on a monthly basis. Subscribe to our newsletter to keep abreast of future data insights and other relevant topics by visiting yagro.com and hitting subscribe.

Our Rubik's Cube Analogy

At Cereals this year, we spoke about how farm data is similar to a Rubik's Cube. When farm data is held separately across spreadsheets, clipboards and notebooks – it holds little value. This is like an unsolved Rubik's Cube, with none of the data integrating or providing any actionable insight.



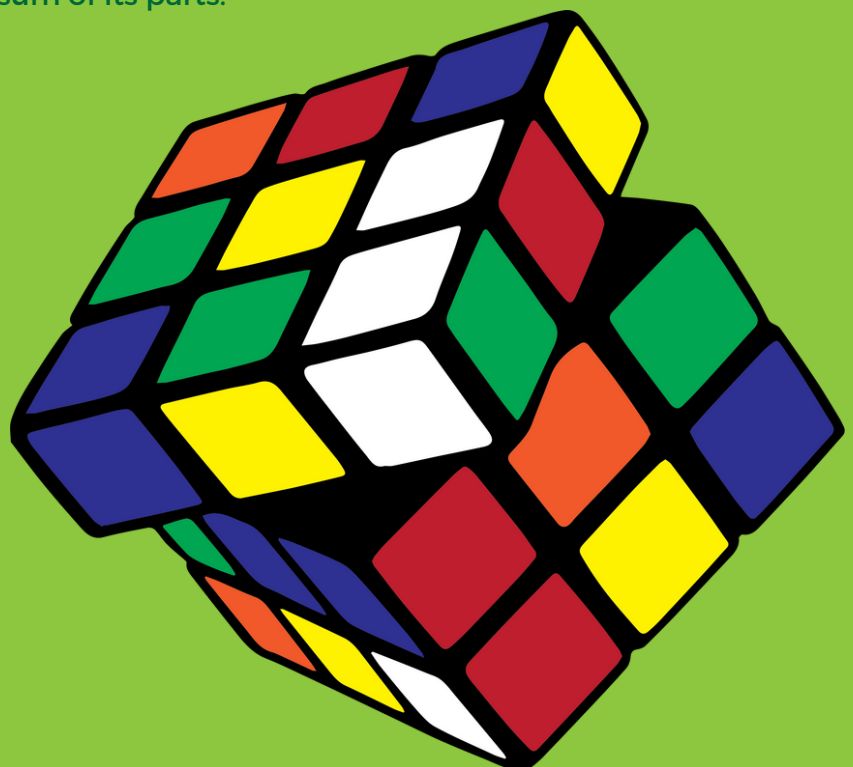
It's understandable that there is always something more pressing on the to-do list than figuring out how to solve your farm data Rubik's Cube.

That's why YAGRO is the place where all those colours align. You no longer have to spend days, weeks or years learning how to get real value from your farm data by poring over spreadsheets. There are tools and teams out there that can solve the puzzle, extracting and presenting the value for you.



Too often farm data sits on the shelf, an unsolved Rubik's Cube, with the value it holds gathering dust. This hidden value yet to be unlocked could be monetary, saved time, increased yields, enhanced knowledge or even a good night's sleep; knowing your decisions are properly informed and data-led.

Utilise your farm data to the full and ensure you're receiving value greater than the sum of its parts.



With thanks to our contributors

Gareth Davies



Gareth Davies is Managing Director and Co-Founder of YAGRO, the UK leader in farm data intelligence. He is Chair of iSDA Africa, a pan-African pioneer of digital soil agronomy services, and initiated the formation of the British Farm Data Council, establishing the Principles and certification for good farm data governance in British agriculture.

Previously at Syngenta in Switzerland, Gareth led a business development unit exploring novel business and investment models to serve farmers across the world. He has also worked in top-tier strategy consulting across a wide range of industries, particularly global agribusiness.

Until 2021, he was Trustee and Member of the Board for the Royal Agricultural Society of England,.

Dr Thomas Gate



Thomas is an Analyst in the Data Team. With a passion for data and agriculture, Thomas grew up around farming and agronomy. With a day-to-day role of cleaning, processing and analysing complex data sets for bespoke farm projects, Thomas and the Data Team are exploring the endless possibilities of how data can be best used to aid and inform farmers.

Thomas recently completed his PhD in Plant Nutrition. Outside of work, Thomas enjoys getting outdoors through playing football, running or a bit of gardening. He also likes to expand his programming skills with a variety of small projects.

Luke Sayer

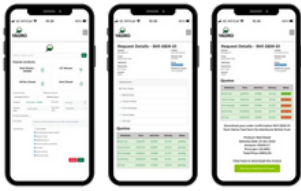


Luke is our technical copywriter. With a background in the Arable Trials sector and a First Degree in English, Luke is responsible for writing our articles and also handles press relations.

His journey in agriculture began in 2008, when he worked his first harvest. Over the next 15 years, Luke worked a dozen harvest seasons - becoming a full-time Arable Trials farmer from 2019 to 2023.

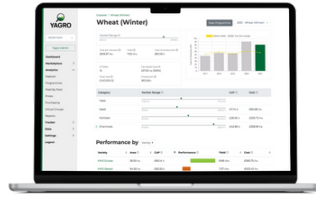
In his YAGRO articles, Luke emphasises the crucial role that data and technology play in modern agriculture. He believes that listening and responding to farm data is the surest way to increase sustainability and efficiency in this ever-evolving industry.

MARKETPLACE



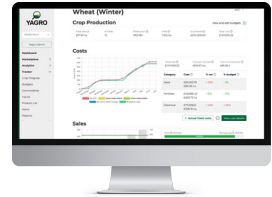
Providing the confidence that you are getting the best current prices. Marketplace is designed to take the hassle and time requirements out of ordering farm inputs. Our systems allow farmers to effortlessly reach out to a range of suppliers for comparative live quotes, ordering at the click of a button.

ANALYTICS



Farming is a game of decisions. It's time to move on from estimations, gut-feel and 'what we did last year'. It's time you had the data-driven answers that will give your business the edge you need. Analytics is our flagship module within the platform.

TRACKER



Tracker allows for a clear plan at the beginning of the season and adjustable throughout to meet seasonal challenges. Our latest addition to the platform. Comprising four key features; Tracker, Budgets, Commodities and Inputs to provide in-season reporting.

“If we didn't have this information, then we'd effectively be making blind decisions, risking damaging the long-term viability of the business.”

Graham Innes
AP Innes

“By clicking a couple of buttons, the YAGRO platform highlights my opportunities on the farm and collates all my information in a way that allows me to focus on running my business rather than staring at excel spreadsheets.”

Jamie Key
R W Key

“Am flabbergasted at how fantastic this is bringing all our data in one easy to use format, I love this kind of thing, absolute credit to whoever thought, designed and got this off the ground, they need a medal”

Duncan Hazard - RM Hazard







FOR ACCESS TO OUR ONLINE VERSION

HARVEST 23
REVIEW