

How
**EVIDENCE-BASED
PRODUCTION**

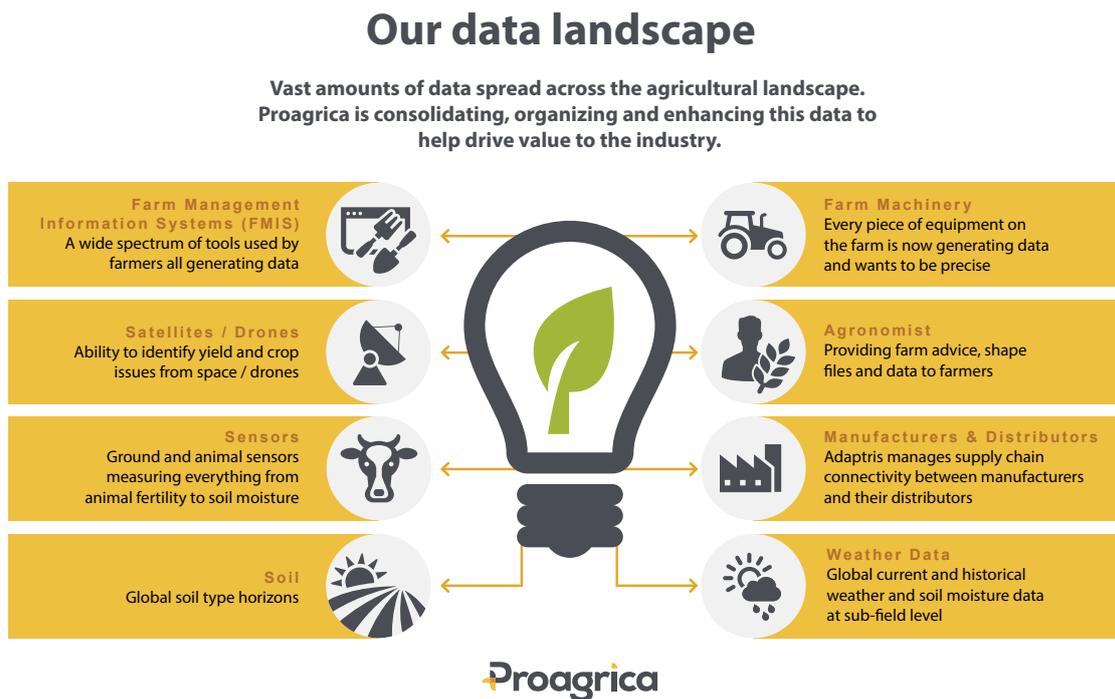
will drive productivity
and profitability
across agricultural
supply chains





Proagrica describes evidence-based production (EBP) as “the method of farming that embraces technology and utilises data to inform production on farm”. In addition to farmers, it involves agronomists, advisors, input suppliers, processors and retailers who use data to influence farm-level decisions. Back in 2012 DEFRA¹ reported that farmers’ uptake of GPS technologies (including auto-steering) and soil-mapping surpassed 20 per cent and the uptake of variable rate application and yield mapping was also significant. Since then, BCG² research shows that investment and uptake of these and other technologies has advanced much further, thus improving productivity, not just for farmers but for other stakeholders as well. This trend will accelerate as the deployment of open and neutral platforms, from companies such as Proagrica, become mainstream. These platforms offer a secure and scalable infrastructure for innovation across the entire supply chain as the following case-studies and infographics illustrate. These include enhanced traceability to provide better provenance, enriched market insights allowing more customised marketing initiatives and greater visibility across the entire market to enable better decision-making at an individual business level.

Figure 1: Overview of the Evidence-Based Production Landscape



Farm-Level Impact

On-farm performance is a critical determinant of whether a new technology will be accepted across agriculture. EBP is no different and a 300 hectare European arable farm has been used to show its farm-level benefits. This farm primarily grows wheat (150 Ha) in addition to oilseed rape and spring beans. Like many farms it is experiencing disease pressure and weed infestation issues. **Figure 2** sets-out the farm’s current wheat enterprise performance (business as usual) and its projected performance using EBP.

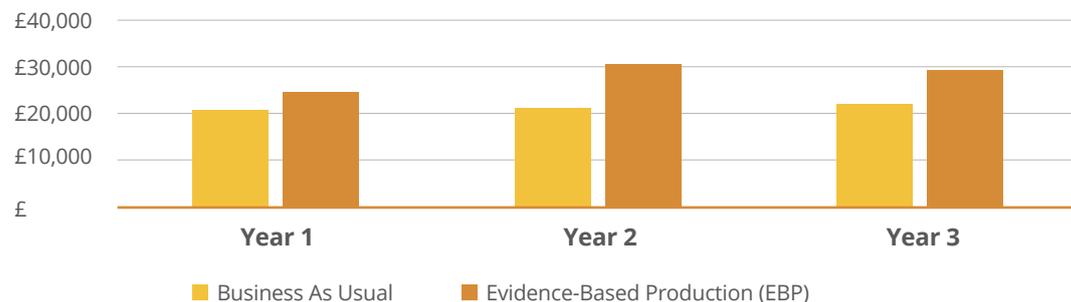




Figure 2: Farm Profitability Assessment – Wheat Enterprise

Wheat Performance Summary	Status Quo – Year 1	EBP – Year 1	% Change
Output	(£/farm unless stated)	(£/farm unless stated)	
Yield (t/ha)	9.05	9.38	+3.7%
Price (£/t)	£139	£139	
Total (incl. support payment)	£219,426	£226,327	+3.1%
Production costs			
Seed, pesticides and fertilizer	£64,664	£61,760	-4.5%
Labour, power and machinery	£52,544	£50,916	-3.1%
Other costs	£80,939	£80,901	-0.2%
Total production cost	£198,147	£193,577	-2.3%
EBP equipment cost		£7,900	
Net Revenue	£21,279	£24,851	+16.8%

Net Cash Flow - Business As Usual vs EBP



Overhead costs (e.g. labour) were apportioned to the wheat enterprise on a pro-rata basis. EBP technology was deployed to map out the areas of each field where yield was higher or lower than average. Drawing on data such as weather information, weed infestations etc., the agronomist varied the applications of seed, pesticides and fertiliser to optimise productivity and profitability. The resultant yields, application rates and costs were calculated for each 10m² zone within each field and then aggregated to gauge overall performance. The results show that for an investment of £7,900, this farm could gain nearly £3,750 for the wheat enterprise in year 1 alone. Over a 3-year period, the farm’s projected net revenue gain is forecast to be around £20,000. To address its weed issues, pesticide application rates were tailored in accordance with each zone’s needs. Some areas were left uncultivated to permit the most infected areas to be treated with glyphosate. Other zones received a higher seed application to out-compete weeds. Overall, the volume of pesticides used decreased by 6% across the farm. All the while, the farmer decides who has access to the farm’s data but benefits fully from the data sourced elsewhere in the supply chain.





Benefits to Distribution and Agronomy Companies

Applying the previous example to a pesticides distributor that provides agronomy services to 1,500 similar farms, illustrates that whilst the volume of pesticides ordered may have decreased, the company now has an opportunity to attract more customers and hence boost market share. The following are the key gains that can be achieved:

- **No. of customers served:** reduced application rates mean that for the same volume of pesticides procured, it can potentially serve 90 additional farmers, thus boosting market share and profits.
- **Yield performance:** applying a 3.7% yield improvement across all farms equates to 75,000 additional tonnes of wheat harvested, using fewer inputs.
- **Improve decision-making:** permits users to analyse historic crop data spanning several years to give more robust risk assessments. Without EBP, decision-making is in danger of being based on disease risks most prevalent last year, despite the current year being substantially different weather-wise. EBP provides easy access to a vast knowledge-base which gives direction to agronomists on what the data is signifying and what needs to be done to better protect crops.
- **Better stewardship of chemistry:** with the availability of key pesticides under increasing threat, applying products based on a precautionary principle is not sustainable. Agronomists need accurate real-time and historic data to give additional perspectives to determine which diseases are the greatest threat, resulting in better and more sustainable solutions than field-walking alone.
- **Improved delivery:** demand spikes can be spotted faster and stocks can be proactively managed thus permitting better procurement from manufacturers and a more efficient delivery to farmers.

Benefits to Crop Protection Suppliers

Expanding on the above examples, for an ag-chemical manufacturer that serves 5,000 farmers, utilising a combination of large-scale agronomy companies and independents, the profitability gains become even more substantial and a number of additional benefits can also be realised.

- **Hectares treated:** the same volume of herbicide can potentially be applied to an additional 45,000 hectares of wheat.
- **Improved efficacy:** targeted applications of herbicide that prioritise the areas in most need means that the effectiveness of crop protection improves whilst simultaneously decreasing the scope for weeds to develop resistance. This enhances the longevity of its products.
- **Better return from R&D:** through more effective and longer-lasting products whilst negating the need to constantly plough additional funds to develop new products to combat resistance. This equates to huge savings, especially considering a 10-year product development timeline.



- **Assist with the pesticides approvals process:** using real-time EBP data to demonstrate to regulators that pesticides are being applied safely on-farm could play a major role in future. It will also enable manufacturers to proactively ensure that pesticides are being used correctly by farmers.
- **Be perceived as a valued partner of the farmer:** drawing upon the above points, crop protection companies can leverage EBP to help farmers to grow the better quality crops which are most suited to an individual farmer's circumstances. Therefore, there is an opportunity to add significant value as opposed to being perceived as cajoling farmers in a bid to maximise pesticides usage.

Benefits to Farm Management Information Systems (FMIS) Providers

- **Facilitate decision support functionality:** customer requirements have evolved well beyond tools to simply record data. They now expect smart-connected decision support systems that are interoperable with other platforms (e.g. machinery) and enable users to conduct advanced analyses combining multiple datasets. EBP achieves this efficiently by offering seamless connectivity with other platforms which makes FMIS exponentially more powerful. An isolated dataset from a single FMIS will be rendered obsolete in future.
- **Access vast data repositories cost effectively:** in other sectors, companies such as Airbnb automatically scale their offerings using Amazon web services³. For FMIS providers, rather than building the infrastructure and data repositories from scratch, evidence-based production portals permit such companies to draw upon existing data and to focus on adding value to their specific product offerings whilst avoiding expensive integration costs.
- **Enable a stronger commercial relationship with customers:** by gaining more insights into customers' practices, a more tailored sales and marketing approach can be offered which includes personalised services to enable them to identify new opportunities and to benchmark performance so that they can better serve farmers. Furthermore, growers are increasingly required to share data with their customers, to improve transparency, traceability and security of supply. The extent to which this can be automated greatly increases with EBP and constitutes a significant competitive advantage for an FMIS.

Benefits to Farm Output Buyers

Downstream from the farmer, the potential gains from EBP are also considerable and these will become more critical as the global population rises. Key benefits include:

- **Accurately match supply with demand:** food processors and retailers increasingly utilise real-time yield data from farms to gauge how much supply of agricultural raw materials is available locally. This data enables them to more accurately calculate whether they need to source additional raw materials from elsewhere.
- **Take better trading positions:** for a commodity such as grain, the cost of making a wrong trading decision could equate to several hundred thousand pounds. For example, a food processor that is unable to accurately estimate grain volumes that suppliers are currently harvesting could mean that they needlessly place additional options on the futures market which need to be cancelled later on. If the call option placed was for 30,000 tonnes of

wheat, this could equate to £234,400 (assuming a call option price of £7.82/tonne). Having the most accurate information that is easily accessible and combinable with other datasets can play a crucial role in reducing volatility by decreasing the degree of speculation at critical periods thus having a major effect on food prices and incomes.

Benefits in Promoting Supply Chain Sustainability

- **Significantly reduce waste:** in Europe, waste is a critical concern to consumers⁴, a significant proportion of which occurs between the farm and the retailer. EBP can play a major role in reducing waste by better matching supply with demand for both food commodities and inputs.
- **Conserve scarce resources and feed more people:** the ultimate benefit of EBP is that it provides the infrastructure to manage key assets such as water, soil and fertiliser more efficiently and at the same time assists the agricultural and food industry to feed more people.

More and More Companies are Already Benefiting

The considerable challenges facing the food and farming industry are becoming more pronounced. The necessity to deploy more intelligent data-driven solutions, such as evidence-based production, are becoming increasingly paramount. EBP is no longer an abstract concept. Globally, a considerable proportion of farmers and input suppliers are already using such technologies and are realising considerable benefits. Farming is changing and each company supplying agriculture has a role to play to feed and fuel the world sustainably. Companies that are not proactive in deploying cost-saving technology which benefits its customers as well as its own business, will suffer as a result amidst the increasing collaboration within the industry.

For further information on how you could start benefitting from evidence-based production, please visit www.proagrica.com/EBP.

References

¹ DEFRA (2012), "Farm Practices Survey October 2012 - Current Farming Issues".

² BCG (2016), "Lessons from the Frontlines of the Agtech Revolution".

³ For further information visit: aws.amazon.com/solutions/case-studies

⁴ European Commission (2014), "Attitudes of Europeans towards Waste Management and Resource Efficiency".