AHDB

AGRICULTURE & HORTICULTURE DEVELOPMENT BOARD

AHDB RESPONSE TO BEIS BUSINESS PRODUCTIVITY REVIEW

GOVERNMENT CALL FOR EVIDENCE

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AHDB

JULY 6, 2018

About AHDB

AHDB's purpose is to inspire farmers and growers to succeed in a rapidly changing world.
Funded by the industry, for the industry, with a levy income of around £60 million annually, our organisation occupies a unique place at the heart of British agriculture, horticulture and the supply chain. Our activities span the whole of the UK and cover the beef and lamb, cereals and oilseeds, dairy, horticulture, pork and potatoes sectors (approximately 72% of UK agricultural output).

AHDB provides a variety of functions and services:

- *Near market and applied research and innovation to tackle the everyday challenges that farmers, growers and the supply chain face*
- *Knowledge exchange with and between farmers, skills development and benchmarking*
- *Independent market analysis and intelligence to enable businesses to make informed decisions*
- *Building export markets for British meat, dairy products and crops*
- *Domestic market development to inspire our consumers*

Our unique position as an arms-length body working for and on behalf of the industry puts us in a particularly important position to support the industry to make the most of the opportunities that a new agriculture policy in England will bring. AHDB is both keen and able to partner with both industry and government in many areas to help ensure a successful future for UK food, farming and the environment. AHDB employs more than 400 skilled and committed staff who, along with the stakeholders with whom we work in close partnership, give us a strong perspective on the challenges and opportunities the industry faces.

Our current strategy, published in December 2016, identified four over-arching priorities where, working as one organisation, we are focussing our efforts.

These are:

1. Inspiring British farming and growing to be more competitive and resilient

2. Accelerating innovation and productivity growth through coordinated R&D and KE

3. Helping the industry understand and deliver what consumers will trust and buy

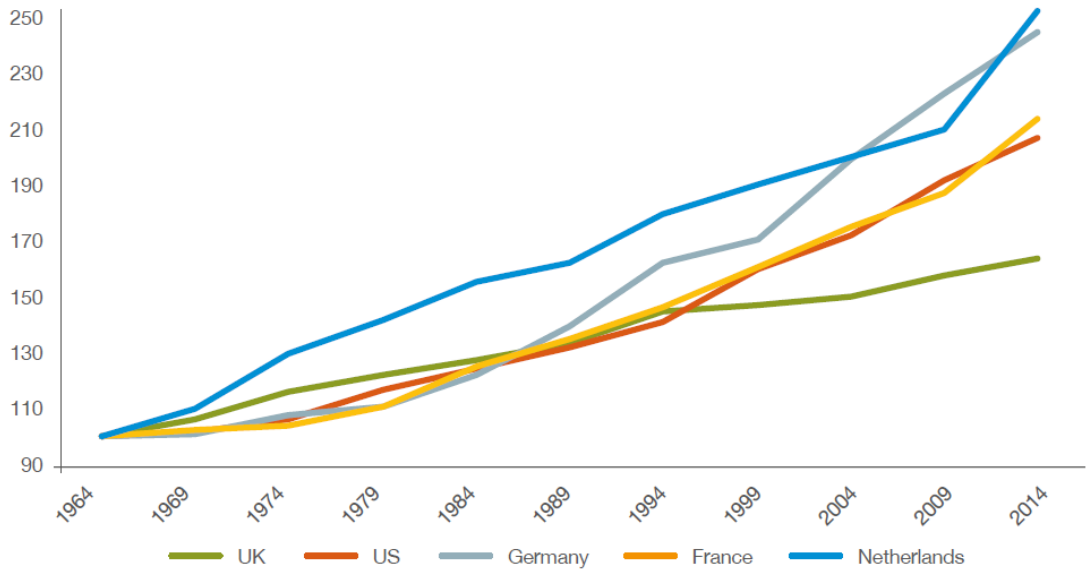
4. Delivering thought leadership and horizon scanning

Productivity growth is of critical importance to UK agriculture and horticulture for two fundamental reasons. First, productivity plays a significant part in our industry's overall competitiveness, which is critical if we want to operate in increasingly globalised markets. This matters both because we want our industry to seize market opportunities at home and abroad and we want the industry to become less dependent on direct support as we move away from the Common Agricultural Policy. Secondly, productivity is also a key driver in overcoming the environmental challenges we face. Productivity and environmental responsibility go hand in hand.

Two indicators are frequently used to measure productivity growth as a whole – total factor productivity (TFP) and average labour productivity (ALP). TFP measures how effective our agriculture and horticulture sectors are at converting all inputs into outputs. It is a useful and important way of measuring our industry's productivity over time and against key competitors. Across the whole of the developed world, rates of productivity growth have slowed in the last two decades. Nonetheless, the rate of growth in TFP in the UK has fallen behind that of many of our major competitors, averaging 0.9 per cent per year as opposed to 3.5 per cent in the Netherlands, and 3.2 per cent in the USA.

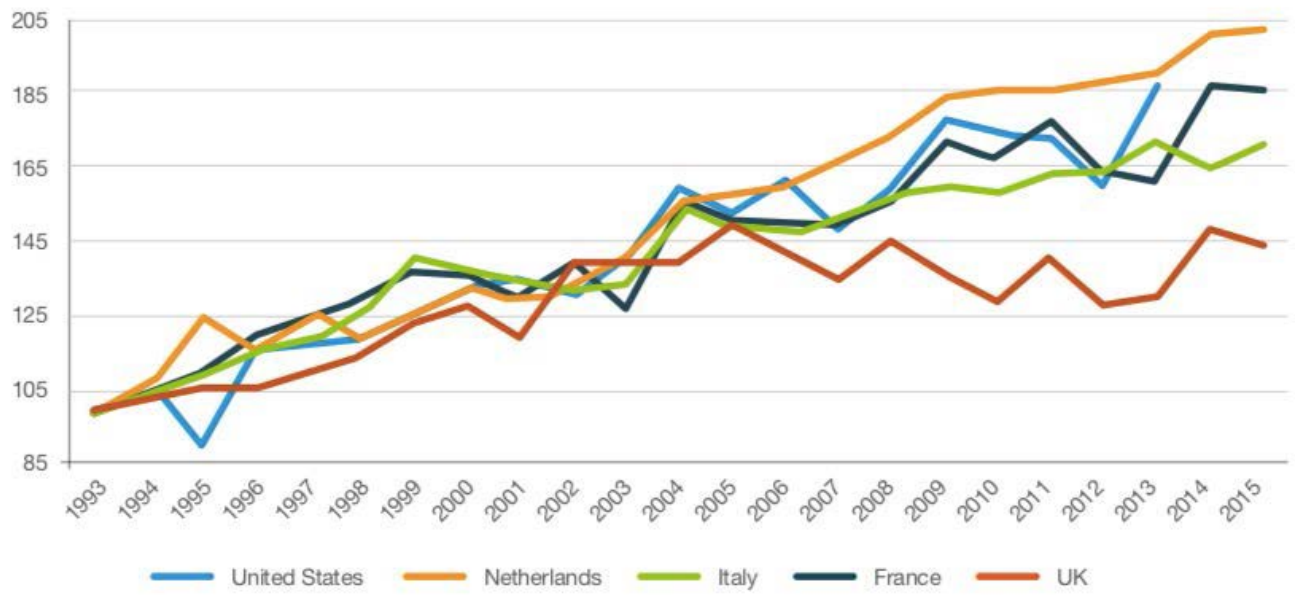
Agricultural labour productivity (ALP) is consistently below that of both our European counterparts, and that of the US, apart from 2002/3. France, Italy and the Netherlands have all operated under the same Common Agricultural Policy (CAP) for the past 40 years and yet have achieved far greater gains in labour productivity than the UK since 2005.

The AHDB Horizon document on 'Driving productivity growth together', January 2018, provides evidence that UK productivity has fallen behind other nations.



Total factor productivity (TFP) annual growth 1964–2014

The report also shows that the Agricultural Labour Productivity (ALP) performance – the amount of output per worker – is behind other nations.

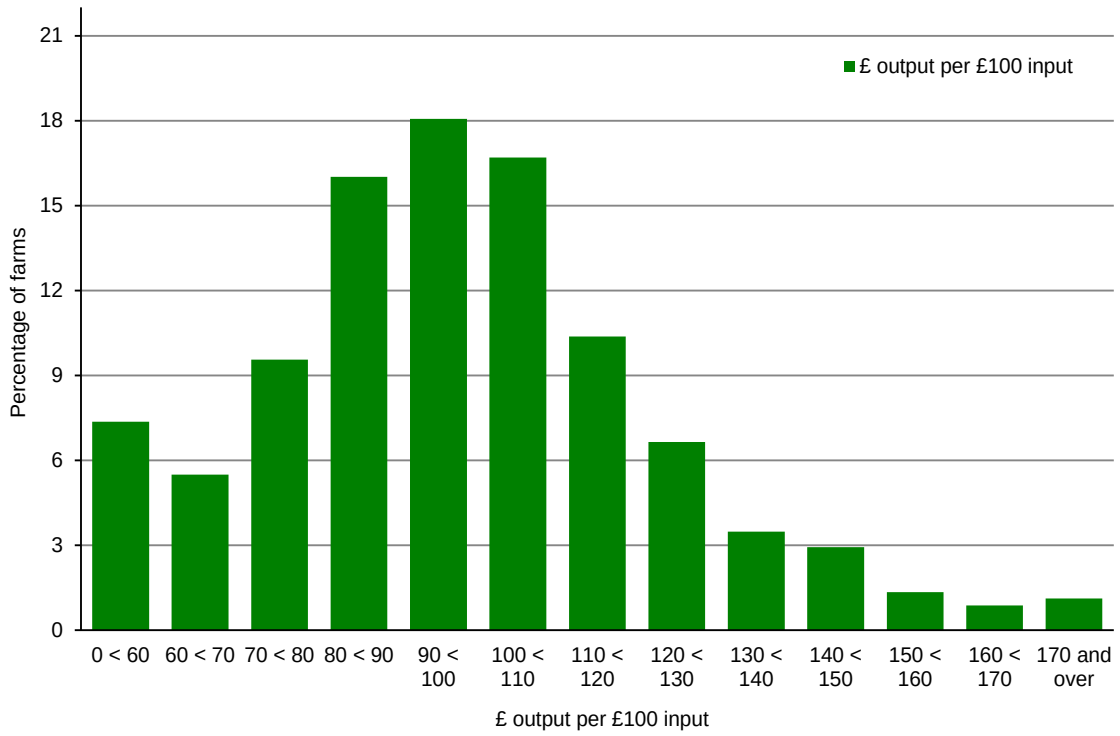


The UK's Productivity Challenge

1. Do you agree with our working definition of low-productivity businesses?

Total Factor Productivity (TFP) tends to be used as the key aggregated measure of agricultural productivity as it takes into account all of the land, labour, capital, and material resources employed in farm production and compares them with the total amount of crop and livestock output. TFP encompasses the average productivity of all of these inputs employed in the production of all crop and livestock commodities.

Whilst extensive data and analysis of farm business performance exists this does not assess the relative productivity of farmers and growers across the key agricultural sectors in the UK. This hampers a clear understanding of where the critical issues are and means there are no standardised metrics that encapsulate productivity at an individual business level. However, it is possible to assess the range in farm business performance based on value added (value generated for every £100 of input – see chart below). This serves to highlight a wide range in UK farm business performance.



The recently formed Agricultural Productivity Working Group, set up under the auspices of the Food & Drink Sector Council has established a stream of work examining performance metrics at farm level to help identify the key measures at farm business level in each key sector than can be used by the industry to inspire better comparison and benchmarking of performance

2. Is there further evidence to compare the UK's productivity distribution of firms to that of other countries?

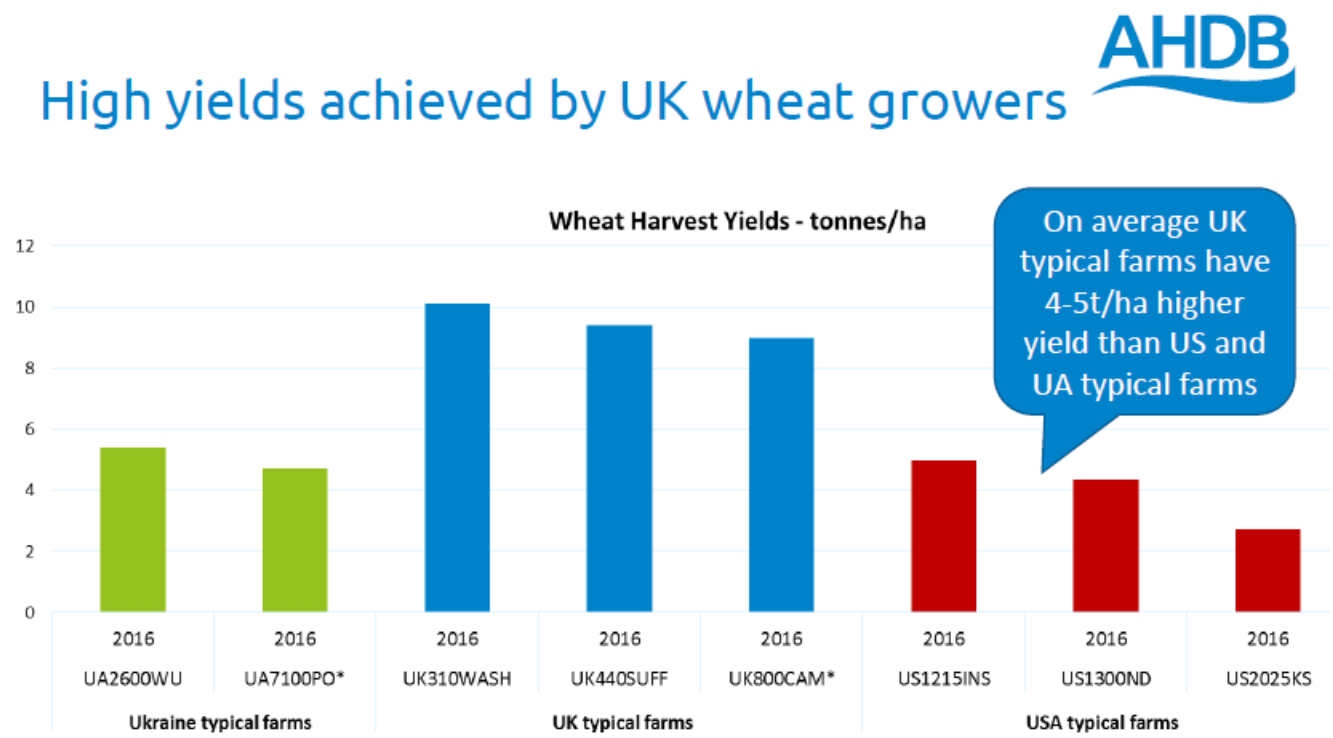
AHDB is a member of Agri-benchmark, International Farm Costing Network (IFCN) and Interpig. These are global networks of countries that share production and costings data. Member provide annual data on 'typical' farms from countries or regions, rather than country averages, thus giving a much better indication of the range of production systems and their relative cost of production, an important indicator of TFP. Internationally standardised methods are then used to compare countries and production systems.

The agri-benchmarking data is used to identify the UK competitive advantage and to identify strengths and weaknesses in UK production, and the wider network data helps identify areas that could be applicable to the UK.

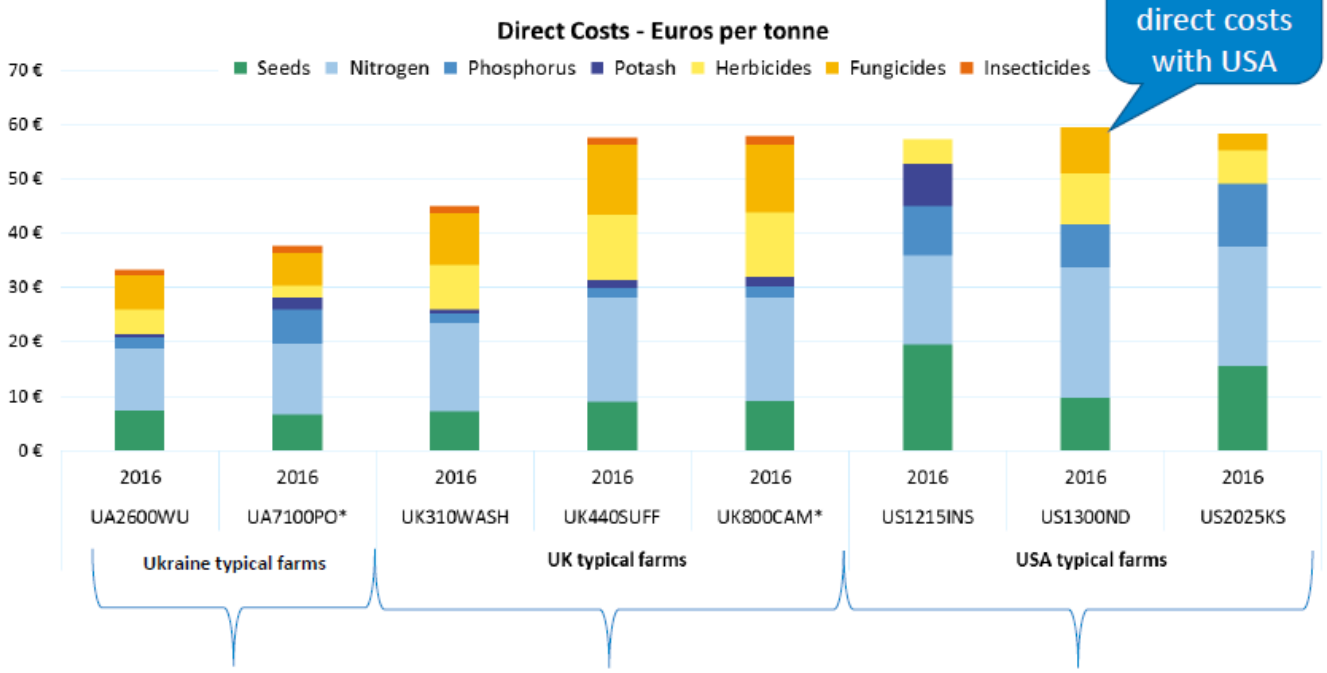
Some of the comparisons are shown below:

CEREALS

The UK tends to produce to achieve higher yields and more intensively requiring higher levels of inputs. For example, the Ukraine wheat producers don't achieve as high as yields as the UK and as such the crop does not have the biological stresses that make it susceptible to disease. Therefore, crop protection costs tend to be much lower. The USA use GMO seed which costs more than conventional seed, but means that less crop protection inputs are required. On a per tonne basis, due to lower yields, overall costs are about the same as the UK but are much lower if compared by per hectare.

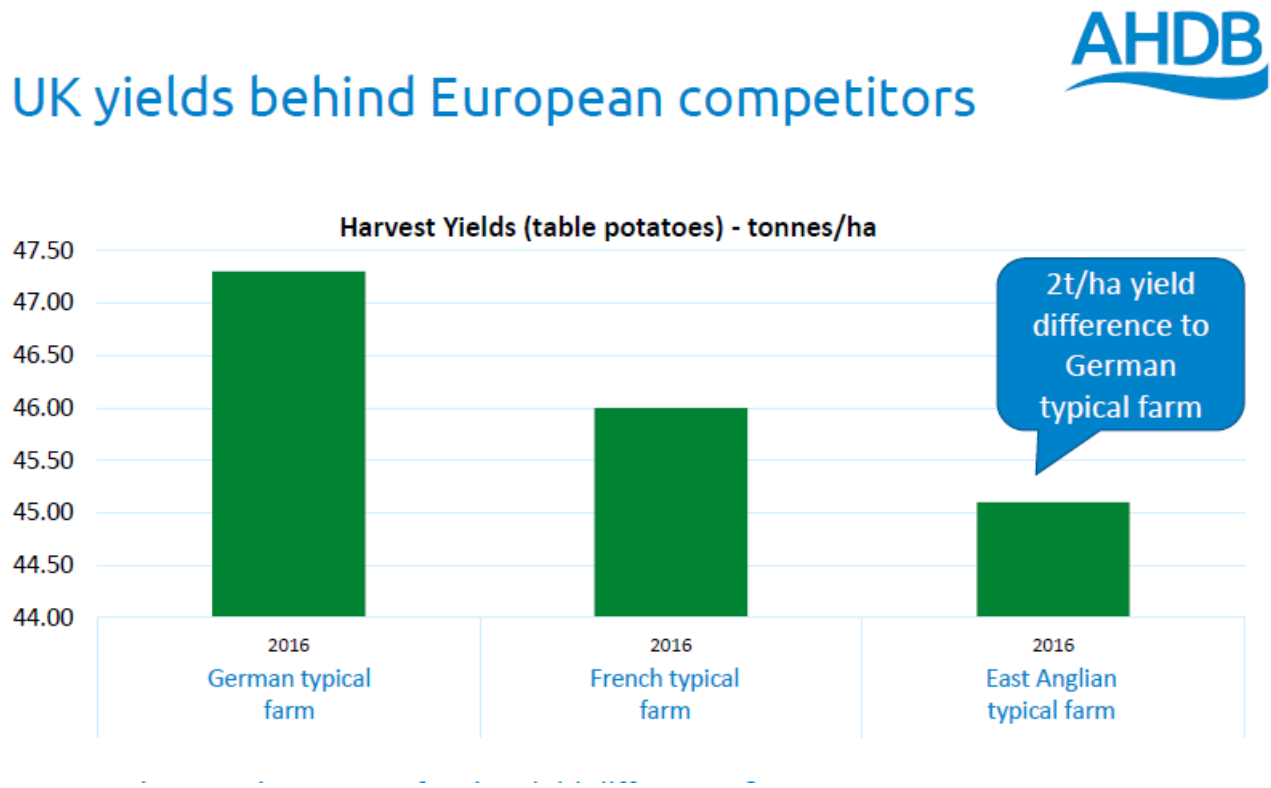


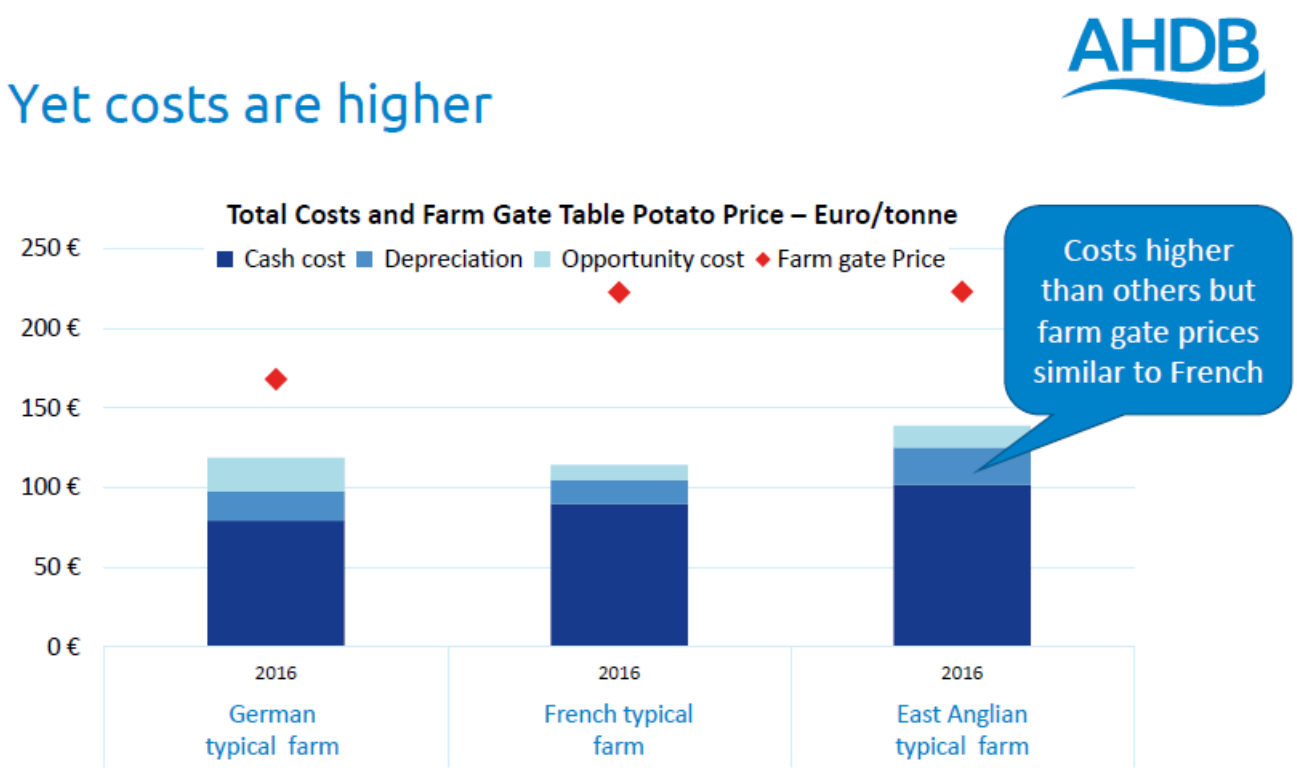
But…high costs as well



POTATOES

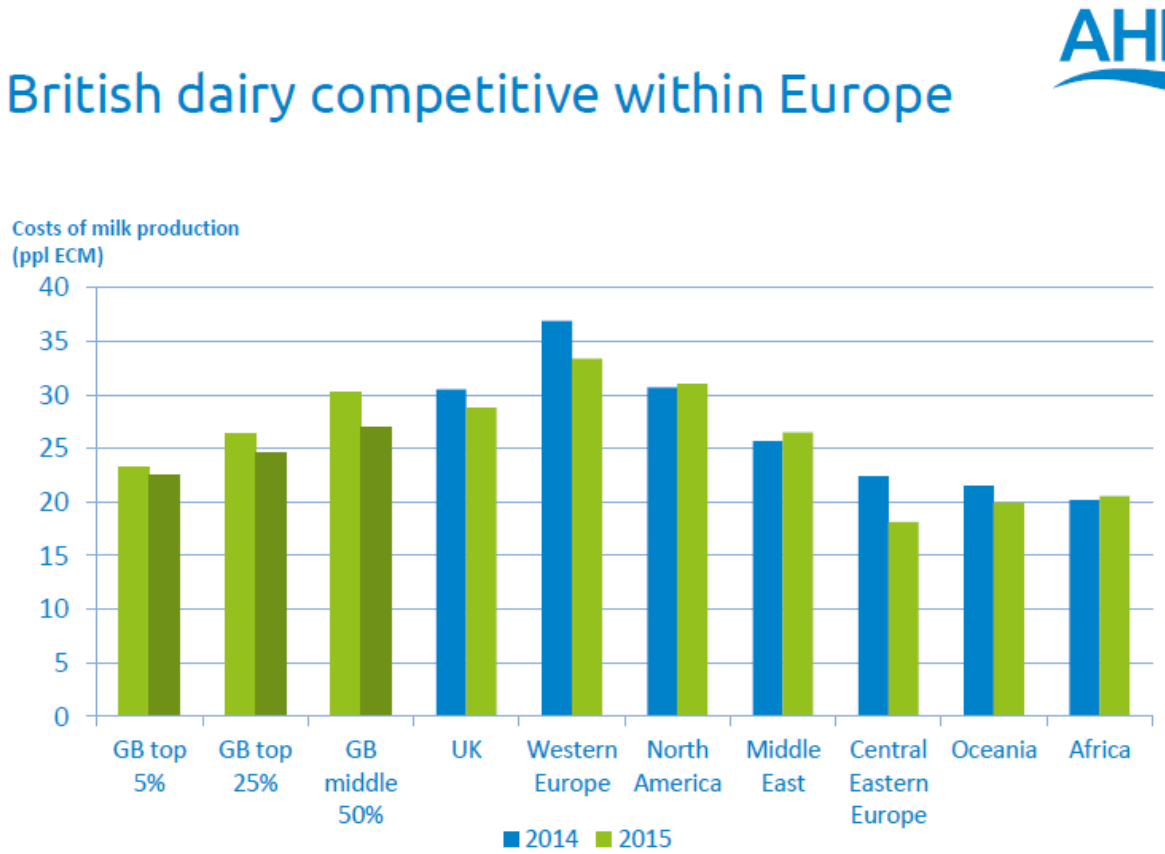
Two reasons for the higher costs of potato production in the UK are the issue of Potato Cyst Nemetode (PCN) and stony soils. UK potato land in comparison with other mainland countries can require the treatment to prevent PCN affecting crops. Also, the land tends to require de-stoning and is a costly practice that many other countries don't need to do. Market requirements tend to be higher in the UK due to the higher level of ware potatoes consumed which means that potato skin finish is important. This is not an issue with potatoes for processing.

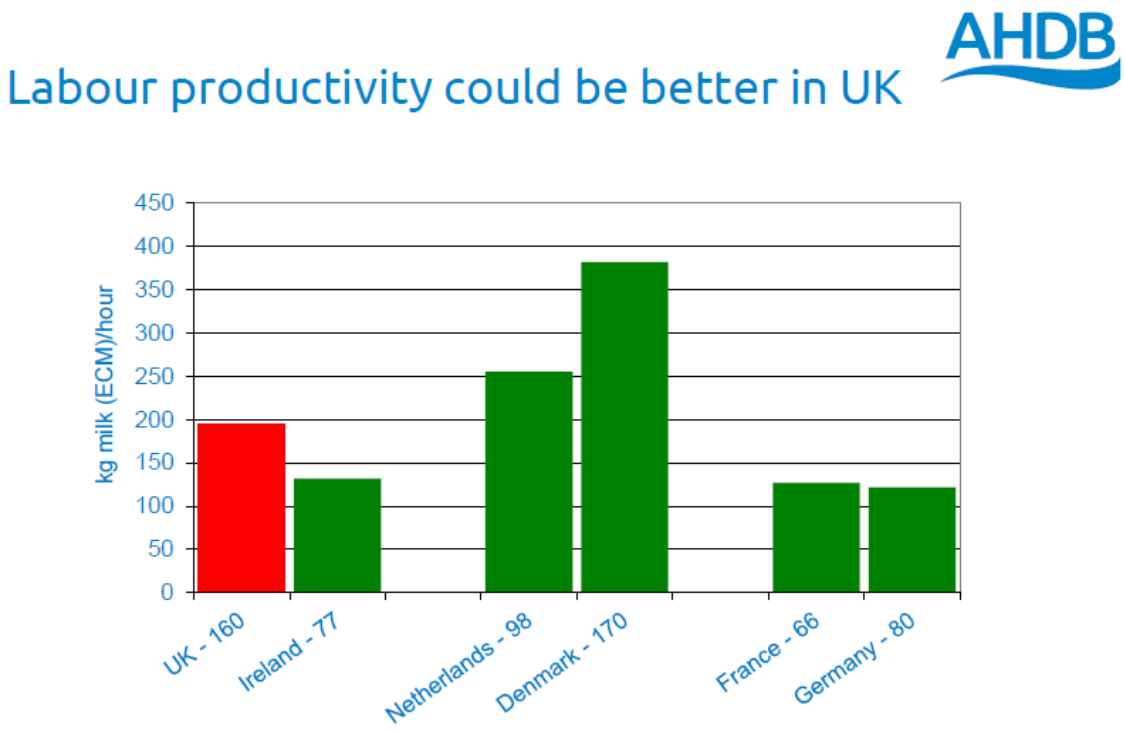




DAIRY

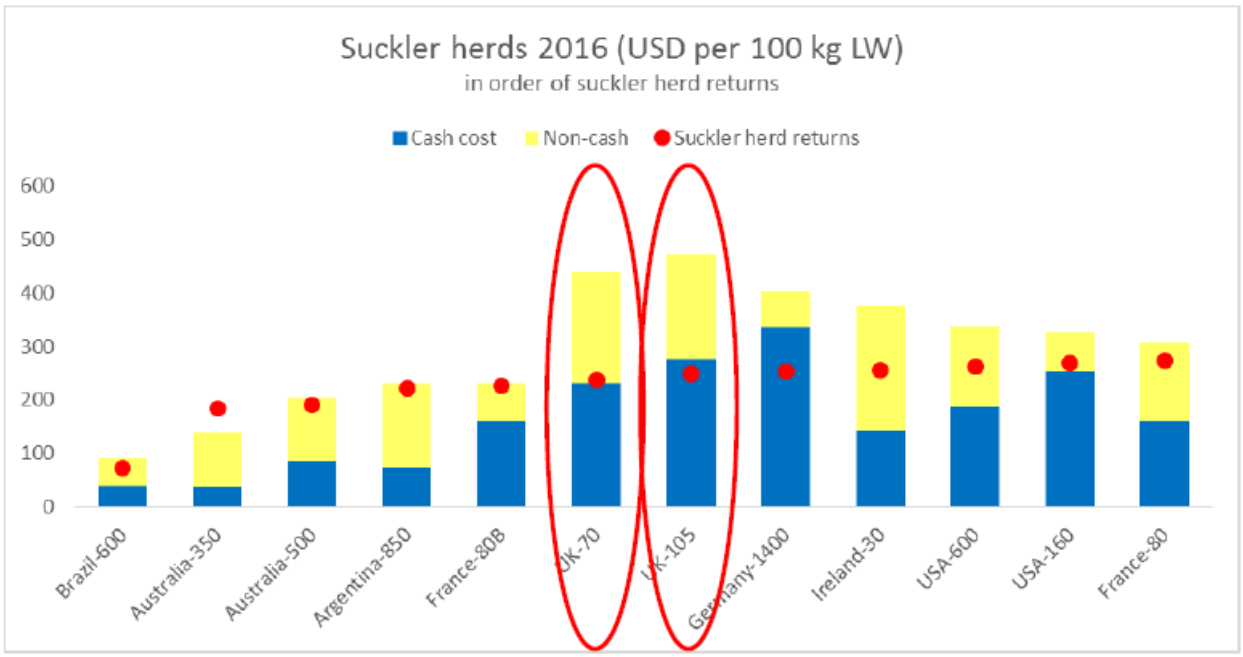
The UK and Ireland's farms appear to lead the way in terms of low production costs compared with the other European typical farms representing their national herd size, but Australia and New Zealand carry even lower costs. This is partly due to differences in the intensity and size of the systems operated. Many farms in mainland Europe invested more in assets than the UK over recent years, encouraged in part by grants available or requirements to meet environmental regulations, resulting in higher depreciation costs. Also, the cost of employing labour in many western European countries is higher than in the UK.

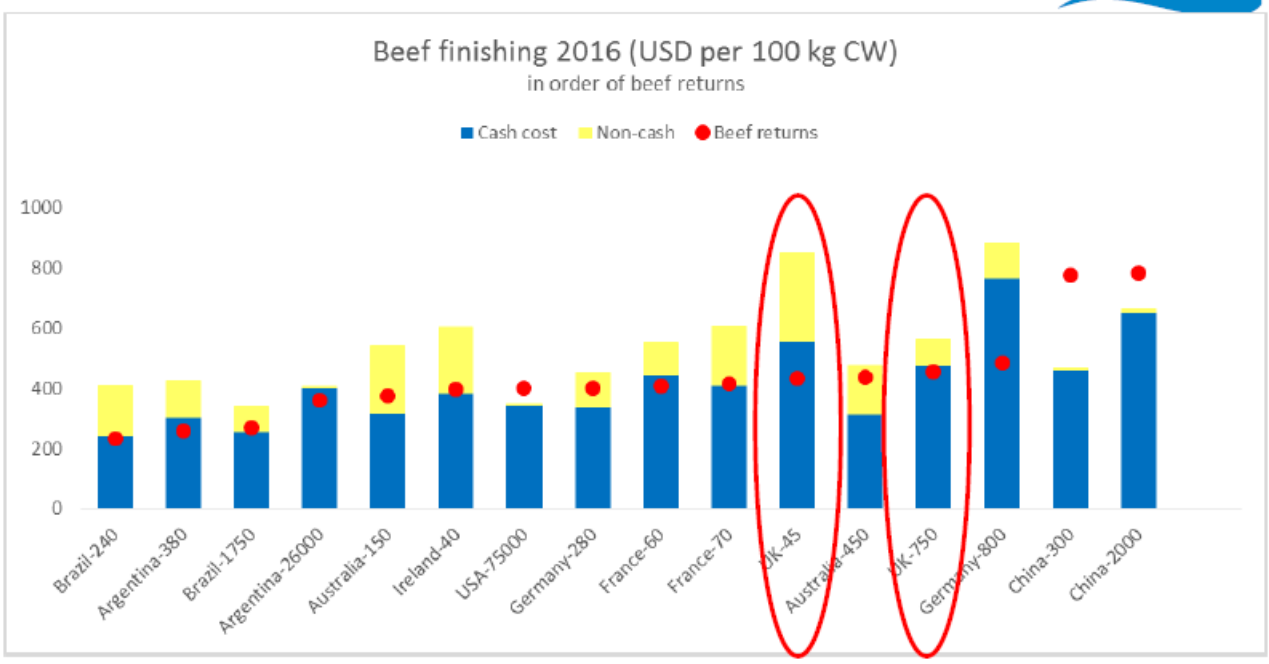




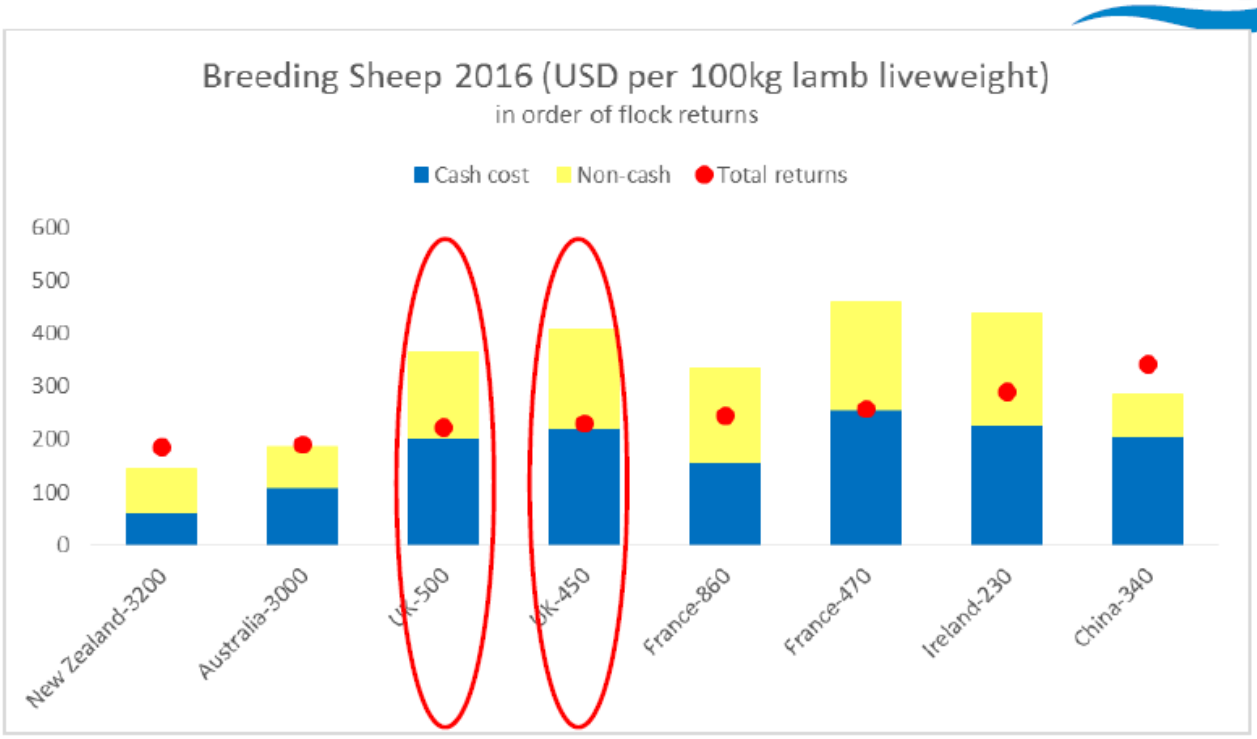
BEEF

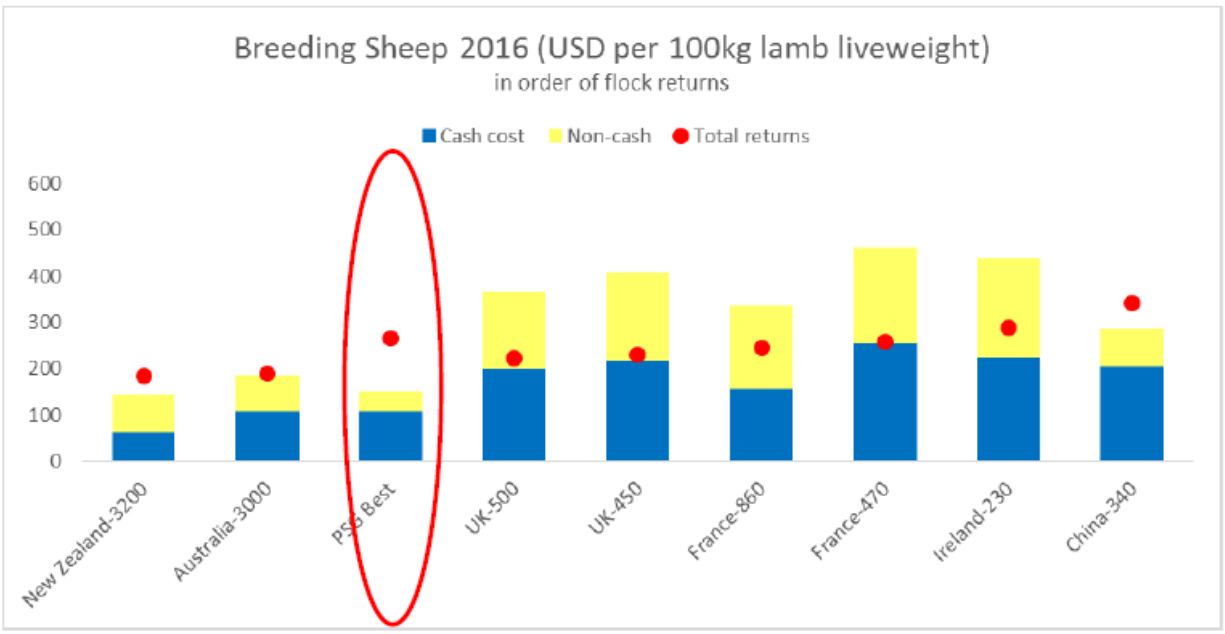
Generally for suckler, beef finishing and sheep enterprises the UK has higher fixed costs in particularly labour and land but also the UK tends to be over mechanised for the size of herds and flocks that we operate partly driven by the incentive to reduce the tax bill. Compared to some countries scale of economy will also be a factor.





SHEEP


Breeding Sheep 2016 (USD per 100kg lamb liveweight)
in order of flock returns
Cash cost
Non-cash
Total returns
600
500
400
300
200
100
0
New Zealand-3200
Australia-3000
UK-500
UK-450
France-860
France-470
Ireland-230
China-340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600
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PSG Best
UK-500
UK-450
France-860
France-470
Ireland-230
China-340

3. Is there further evidence on how the UK's firm-level productivity distribution has changed over time?

Distribution of performance across farms 2015/16 (Agriculture in the UK 2017)

Chart 3.3 Distribution of performance (a) across farms 2013/14; United Kingdom

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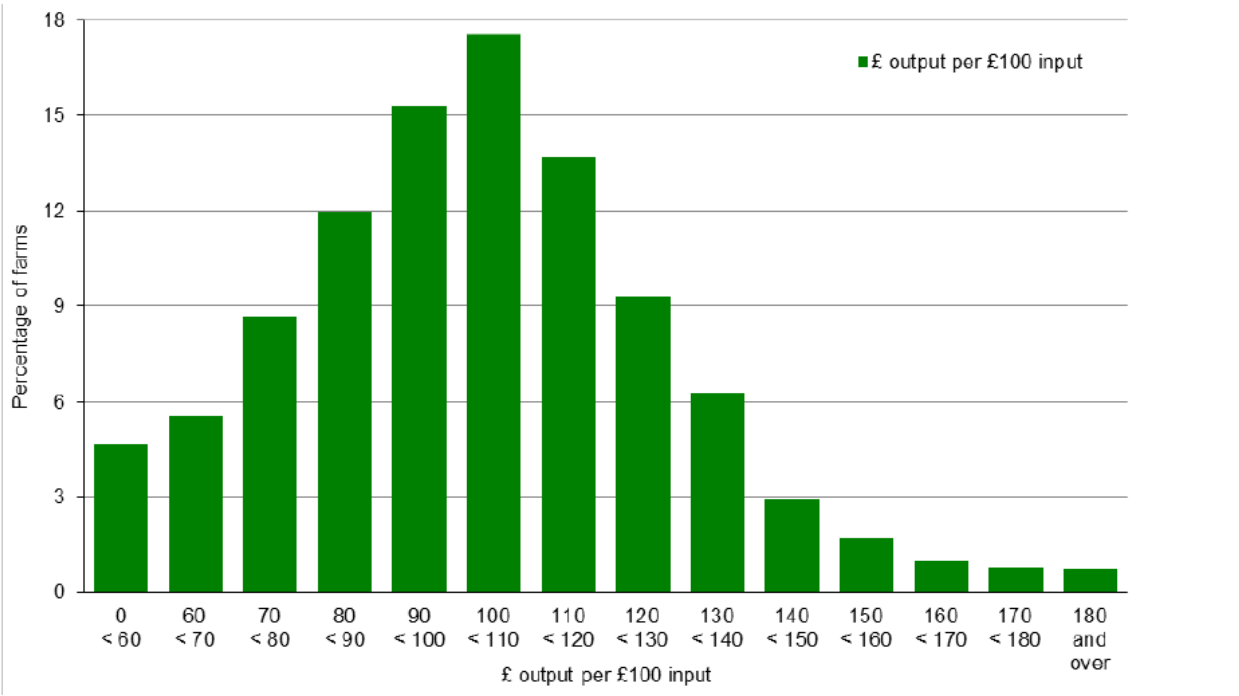
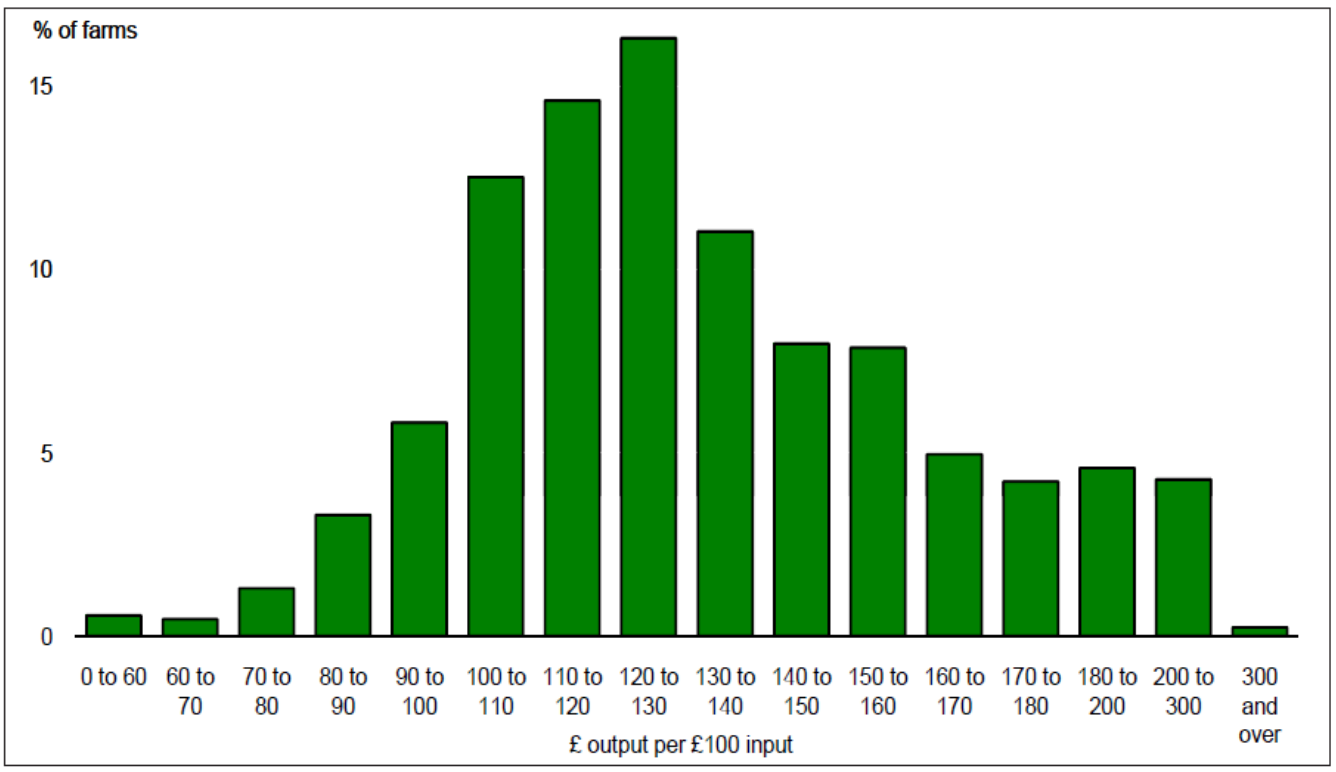


Chart 2.3 Distribution of performance across farms 2010/11; United Kingdom (a)



A comparison of the ratio of £ output to £ input over time shows that the distribution of this ratio has shifted to the left. In addition, the range has narrowed, with fewer farms in the high performance category (over £200 to £300 output to £100 input) and a greater percentage in the long tail, (£0-£100 output for £100 input)

4. Is the long tail of low productivity firms being driven by weaker competition in UK markets?

Greater exposure to competition spurs businesses to innovate and reduce costs. The UK is characterised by a highly competitive and open food system so AHDB do not see lack of competition as a key driver of low productivity. Food chain is characterised by many sellers, few buyers. However, the food chain is no less competitive as a result of being in the hands of relatively few businesses. Indeed, it is plausible to argue that excessive competition within the grocer supply chain main have undermined margins and thus the ability of businesses at firm level to invest.

In addition, there is scope for businesses to collaborate, rather than compete, at farm level in order to grow productivity. A good example concerns farm machinery. Evidence from benchmarking of arable businesses identified fixed costs such as machinery as a key differentiator between top and bottom performers. Better utilisation of machinery through sharing may in some instances lead to greater productivity.

The UK's Productivity Challenge - Understanding high and low productivity businesses, and the firm-level characteristics driving the performance of each

5. Is there further evidence from the UK or internationally, on what drives the distribution of business productivity?

The Organisation for Economic Co-operation & Development (OECD) has produced a comprehensive assessment of factors associated with productivity and competitiveness, drawing from a number of academic sources – see www.oecd.org/tad/fostering-productivity-and-competitiveness-in-agriculture-9789264166820-en.htm

The main ones that appear to distinguish the UK from our major competitors are:

Business environment – This relates to the wider macroeconomic context in which farming and horticulture businesses operate. Factors include regulation, taxation, inflation and growth, planning, and infrastructure. Favourable, stable economic conditions provide a foundation on which businesses can invest and grow.

Natural capital – This includes topography, soil condition, access to water and climate. These are factors that can place certain physical limitations on the ability to grow productivity. However, improving our natural capital, notably the condition and quality of our soil, can make an important contribution to long-term growth in productivity and sustainability.

Competitive pressures – Greater exposure to competition spurs businesses to innovate and reduce costs. The UK is characterised by a highly competitive and open food system.

Policy – Specific policy incentives can play a part in increasing productivity growth through promoting incentives for new entrants, incentivising uptake of new skills and harnessing new technologies. Although it is often argued that direct support payments have hindered productivity growth in the UK, that does not explain why some other EU countries such as the Netherlands have grown productivity at a faster rate than the UK.

Ideas – The right innovation can push the frontier of productivity growth but it is essential the means exist to transfer and exchange knowledge. According to the OECD, innovation and research and development (R&D) are the main source of agricultural productivity growth in the long run, delivering a return on investment of between 20 and 80 per cent per annum2.

People – Improving the skills of the workforce and the ability to harness them via effective leadership are critical to productivity growth. A correlation exists between business performance and levels of skills and education.

6. What do you think are the most important firm-level factors that impact productivity?

In any commodity-based industry such as agriculture, the best performers simply spend less money producing each unit of output when measured on a financial basis. This does not necessarily mean generating more output per hectare or per head of stock. Indeed, higher output accounts for a mere 10 to 30% of higher profits in top quartile operators in farming, lower costs contributing to 65 to 90%[1]. However, in a world where margins are (over time) ever tightening, in order to retain a steady profitability in real terms, it is necessary to generate more output at lower costs.

AHDB have examined the characteristics of top performing farms, as defined by their ability to turn inputs into outputs, via an extensive literature review as well as conducting our own research using Farm Business Survey (FBS) data. This will be published later in the summer. The study identified a series of activities dominated by top performers. Placing them into a hierarchy of importance will vary for each farm according to the farm system, environment, existing skills and resources and performance on the farm, but for the industry overall our assessment of factors in priority is as follows:

1. Minimise overhead costs
2. Set goals and compile budgets
3. Compare yourself with others and past performance and gather information
4. Understand your market requirements and meet them
5. Give each detail the attention it deserves
6. Have a mindset for change and innovation
7. Continually improve people management
8. Specialise

7. Would you add any further characteristics of high productivity businesses as set out in paragraph 3.9?

In addition to the characteristics set out in paragraph 3.9 which are as follows:

- be aware of their own and relative performance;
- regularly review their performance and practices;
- have structured management practices in place (monitoring, incentives, targets);
- be part of a peer-to-peer network;

- have effective relationships with their supply chain;
- utilise a wide range of external advice and support, particularly strategic advice;
- have a clear vision for the business and an up-to-date business plan;
- have higher levels of employee engagement and job satisfaction;
- have more highly skilled managers and staff;
- provide training to improve the skills of managers and staff;
- adopt new technology and utilise digital tools to improve efficiency;
- take part in behaviours associated with growth (e.g. export, innovation, strategic decision-making).

1 Redman. G., (2015), The Best of British Farmers; What gives them the edge? By The Andersons Centre for The Oxford Farming Conference

Leadership and Management

8. Is there further evidence on the links between management practices and productivity? If so, which management practices have the biggest impact on productivity?

The evidence from Eurostat, EU Farm Structure Survey shows that British farmers and growers under-invest in new skills and training relative to their competitors.

Table 1. **Percentage of farm managers who have undertaken some formal training in selected EU member states**

	2013	2013 (Under 35s)
Germany	68%	63%
France	62%	77%
Netherlands	72%	84%
United Kingdom	32%	48%

Source: Eurostat, EU Farm Structure Suvery

When last assessed by Defra's Farm Practices Survey it was found that 59 per cent of farm businesses in England were either unaware, had not considered becoming, or were not a member of a Continuous Professional Development (CPD) scheme. Only 25 per cent had a formal business plan which they reviewed annually and only 25 per cent regularly reviewed their budget. Better-performing farmers are more likely to have qualifications, participate in professional development schemes and undertake risk management practices. In 2013, only 18 per cent of farm managers in England had full agricultural training, with 61 per cent having only practical experience. The variation in qualification levels, skills attainment and ongoing professional development may help explain the wide variation in farm business performance.

The UK agricultural industry requires an ambitious skills strategy in order to inspire the industry itself and to inform policymakers and funding agencies. It is a key part of repositioning the industry within a changing world. Agriculture and horticulture are arguably different in nature to many other sectors, due to specific skills needs and the fact that 95% of businesses employ fewer than 10 people and therefore lack professional human resources support.

A strategy and vision for skills is necessary in order to ensure that the industry has the appropriate workforce now and into the future. As technological change continues to impact the industry, further emphasis on the development of the right skills will also be necessary. The AHDB, working in association with the AgriSkills Forum and members of the Agri-food Technology Leadership Council (AFTC) responsible for skills, is keen to facilitate the development of such a strategy, which will contribute to the sector deal for agriculture and food production as part of the wider Industrial Strategy initiative.

9. *What are the main reasons for businesses adopting or not adopting management best practice?*

To some degree, the under-investment in skills and training reflects low levels of demand by producers that could be unlocked by generational change. In addition, it also reflects coordination failures in a crowded landscape characterised by limited cooperation between beneficiaries (farmers), providers, accrediting bodies and funders.

Gaining skills means time away from the farm, which is a perceived challenge for sole traders and small businesses

Implementing changes in management can be a challenge if they also require investment decisions, particularly applicable for some sectors where profitability has been low.

Data from the Defra Farm Business Survey 2017 cites the following reasons for lack of uptake of management best practice:[2]

What PREVENTS you from commisioning/carrying our [more] business planning, benchmarking or management accounting practices?[(a)]

	Percentage of farm businesses (%)	**95% Confidence Interval (%)**
All needed practices already carried out	41	±3

[2] https://www.gov.uk/government/statistics/farm-business-management-practices

Could not find the time	26	±3
Not interested	17	±3
Can't see how benchmarking could help	13	±2
Do not have the appropriate skills/knowledge	16	±3
Cost (e.g. courses, software)	18	±3

10. Are there further examples, from the UK or internationally, of approaches that have worked to increase the adoption of management best practice?

There are various examples of different approaches internationally and two that have involved close collaboration between government and industry are shown below. This collaborative approach that identifies skill gaps in the industry and then addresses these through central provision, via investment in human capital with feedback loops from industry appear to be successful in these instances, and could be transferrable, with suitable adjustment, to a UK environment.

New Zealand: In New Zealand, the Primary Industry Training Organisation (Primary ITO) is funded by government under the Industry Training Act 1992 to set standards and arrange workplace training for people working in the New Zealand primary sector. It develops and maintains national standards for the achievement of more than 290 industry qualifications and arranges training for delivery of those standards – including the assessment of trainees and the monitoring of training quality. The Primary ITO works with industry to develop training and qualifications that align with best practice and to meet current and future skills needs. It also encourages the educational and work–life aspirations of trainees and supports the productivity and profitability of organisations employing them. In 2016, it worked with more than 7,000 employers and more than 28,000 trainees. Its training and qualifications help people achieve their goals in over 30 primary industries, including: Dairy, Meat and Fibre, Horticulture and Viticulture, Seafood, Equine and Sports Turf.

Work was undertaken on 'Future capability needs for the primary industries in New Zealand' for the Ministry for Primary Industries in April 2014[3]. The report begins by saying 'Understanding future capability needs and determining how we build this capability is critically important for lifting the productivity and profitability of New Zealand primary industries'. It further states that there is a common goal between the industries and government to double export returns by 2025 and that human capability is a core asset underpinning each industry's strategy. The report is detailed and considers employment by industry, occupation and qualification level, field of study, region, ethnicity and gender. The report identifies the high-level themes from the industry strategies which are used to inform the skills forecasting. The key findings about meeting future capability needs fall into three major areas: attract, train and retain. The report identifies that an increased focus by everyone on capability improvement is necessary and, interestingly, poses a number of questions which it would be useful to follow up on to see how these have been progressed.[4]

The methodology used for investigating the future capability requirements of the primary industries involved:

[3] https://www.mpi.govt.nz/funding-and-programmes/other-programmes/future-skills/

[4] https://www.mpi.govt.nz/funding-and-programmes/other-programmes/future-skills

- Reviewing strategies developed by individual primary industries
- Collecting historical information about the industries' recent skill requirements
- Preparing detailed employment forecasts up to 2025 based both on the implementation of the strategies and on a business-as-usual basis
- Consulting with stakeholders to expand understanding of industry prospects and allow a critical review of the employment forecasts
- Revising industry narratives and employment forecasts

It is suggested that a follow-up is undertaken to establish the extent to which this work has been adopted four years on, lessons learnt and an indication of cost.

USA: As a result of increasing gaps in the agriculture industry for technical employees on research programs, the United States Department of Agriculture (USDA) formed an education portfolio. It was recognised that across the education pipeline, there were various stages where the relevant subjects relating to agriculture were losing student interest. In particular, NCES Digest of Education Statistics reported that the STEM Pipeline reduced from a potential 4 million students in 2001 down to only 166,530 students that actually graduated in any of the STEM subjects. The USDA gained recommendations that the 'talent pipeline' needed to be extended across all the years of education. With most of the focus on college years, the recommendation was to concentrate on subjects relevant to Agriculture in high school and, for postgraduates, there should be more opportunities for involvement in the current fellowship programme. To assist with the recommendations of widening the talent pipeline, USDA formed an Education Coordinating Committee, with the objective of collating the activity of the 18 agencies that supply research and development on behalf of the USDA. An outcome of their 'Listening Meeting' in 2013 was a pipeline map that aligns the support mechanisms available at each stage of education. Therefore providing the transparency of available Agriculture learning resources to all stakeholders involved in the education industry.

One of the agencies that works on the USDA missions is the National Institute of Food and Agriculture (NIFA). Its mission is to discover, translate, innovate and provide solutions. It does this through an 'Extension Service', utilising already existing knowledge transfer mechanisms at universities and colleges. With a total of 356 Land-Based colleges available to work through, NIFA focuses on gaining funding to research complex issues facing the industry. This research is used to educate schools and universities through training the potential future agriculture workforce. Finally, NIFA provide this knowledge and learned practices to the workforce in the agricultural industry to put the theory into practice.

11. What actions by the public or private sector would be most effective to facilitate effective adoption and embedding of management practice?

The overarching question is whether, working together government and the wider industry can create a more coherent and coordinated knowledge and innovation pipeline that better supports our farmers and growers

The Agri-Food industry requires an ambitious skills strategy in order to inspire the industry itself and to inform policymakers and funding agencies. It is a key part of repositioning the industry within a changing world. While there needs to be a strategy

which covers the whole sector, this comment concentrates on skills and infrastructure support for the agricultural and horticultural industry. This is arguably different in nature, due to specific skills needs and the fact that 95% of businesses employ fewer than 10 people and therefore lack professional human resources support.

UK agricultural productivity lags behind other countries and the lack of the right skills has been widely identified as a key factor. While the agricultural and horticultural industry is highly skilled, the level of qualifications is low by comparison with other sectors, there is poor uptake of continuing professional development (CPD) and less than 35% of UK farmers have any formal management training. This is largely due to lack of awareness of options and benefits, a mismatch in funding and industry needs and a general inertia to develop people. There is recognition of the need to bring more professionalism to the industry and that this is necessary to meet public expectations for post-Brexit support for agriculture to continue. The impending implications of Brexit means that there is a recognised urgency to address the situation in a transformational manner.

The current agriculture and horticulture skills landscape is fragmented and characterised by the involvement of a wide range of bodies. A significant amount of work has already been undertaken and numerous reports have been written covering various aspects. While some of these have included action plans, the action plans have not been undertaken in a coordinated manner, monitored or followed through, resulting in insufficient progress.

The AgriSkills Forum has been instrumental in trying to bring together the various parties and has undertaken significant work to win over hearts and minds. However, while there have been good intentions, in reality, matters are not that much further forward. Over a year ago, the AgriSkills Forum achieved agreement with a number of organisations to work in a collaborative manner, but they have not stepped up to the mark and the agreed actions have not materialised. The fragmentation of bodies, their discrete agendas and lack of realised collaboration is therefore a major cause for concern and has arguably been, and is likely to continue to be, an obstacle to progress.

The Industrial Strategy, the UK Government consultation on 'Health and Harmony: the future for food, farming and the environment in a Green Brexit' (the Command paper) and Brexit offer the opportunity for transformational change which should be seized. Continuation of the same approaches will not achieve change and, consequently, it is timely to think differently.

The policies from the government departments (Defra, BEIS, DFE and DFID) with interests in the success of the agricultural and horticultural industry need to be coordinated and actively engaged across all aspects of the sector. While the Industrial Strategy presents this opportunity, there is a real need for the industry to be engaged with the Department for Education (DfE) to ensure that funding is directed to support courses and qualifications which are aligned with increasing productivity, competitiveness and export potential. This needs to include recognition of subjects involved as STEM to attract greater funding and also to improve perception in order to encourage participation in industry-relevant courses and careers.

There has never been formal agreed collaboration between the range of bodies involved to devise and implement a coherent strategy and to make a real attempt to professionalise the industry at all levels. The current informal approaches have not delivered sufficient results. Continuation of the same is likely to result in slow, inadequate progress and be hampered by a proliferation of vested interests with a lack of overall ownership. In order to drive forward the strategy, appropriate governance will be pivotal to its success. It will require an industry-wide formal approach, in the form of an overarching independent structure, supported at the highest level, which presents a coordinated position not only internally to the industry but externally as

well, which holds the various parties to account. The agreement to support such a structure needs to be robust in order to be able to withstand the continuous adaptation which will be required to meet future and changing demands, all of which, in reality, are likely to pose many challenges. So, as an absolute minimum, the industry must respond to the need for change and collaborate in a formal manner.

However, it is recommended that the theme of coordination and collaboration is further developed in order to take a transformational step forward to professionalise the industry. It is proposed that serious consideration is given to the development of the concept of a new independent professional body as a medium- to long-term objective. In the short term, a Senior Leadership Group should be formed to coordinate current activity, encourage and facilitate collaboration to reduce duplication and drive forward the business case for the professional institute. The new independent, dedicated Institute for the Agriculture and Horticulture Industry (IAHI), working title, would work in an integrated way with the new Food and Drink Council, in terms of both the Agricultural Productivity and Workforce work streams. The IAHI, the 'Institute', would be the vehicle to coordinate the following:

- A professional framework for standards; a professional register
- A careers and recruitment portal
- Continuing Professional Development information
- Business support and research information

The Institute would provide the governance structure to monitor and implement the strategy, which would be delivered either through its own resources or by contracting with other bodies to provide various aspects. By encouraging membership of the Institute, both corporate and individual, it would bring a further professionalism to the industry and also indicate industry and personal ownership of the need for continuing professional development. It would provide a vehicle for agriculture and horticulture, like other industries which have professional bodies, to set standards and promote career paths and undoubtedly drive change within the industry. Indeed, in due course, the Chartered Farmer concept could be considered and developed. The business case for the Institute needs to be developed, but it needs to be an independent, wide, overarching body which is attractive to join.

It is recognised that this model is transformational and also potentially controversial as initially it would be seen as the creation of yet another body. However, it could bring formality to the work done by the AgriSkills Forum, provide added focus to some of the work of AHDB, act as an attractive vehicle to bring together other bodies and provide a focal point for joint investment by industry and government in skills and careers, now and into the future. For the strategy to be successful, it will require full, industry-wide support, including endorsement from the Food and Drink Sector Council.

Technology and innovation adoption and diffusion

12. Is there further evidence to demonstrate the link between technology or innovation adoption and a business' productivity growth?

13. What are the main reasons for businesses adopting or not adopting new to firm technologies?

UK agriculture and horticulture suffer from underinvestment in near market research, fragmentation in our knowledge exchange mechanisms and lack of applied, on-farm demonstration. This inhibits dissemination and uptake of innovation on farm. In addition, the lack of feedback loops to inform innovation needs creates a disconnect between researchers and farmers.

In our view the solutions require a fundamental overhaul of our knowledge and innovation systems (AKIS) to create a new structure that will accelerate sustainable growth in productivity. It is vital that the opportunity to redesign farm policy in England is also seized to redesign our knowledge and innovation system.

AHDB has identified a five point plan which requires industry and government to work in partnership. Specifically this calls for:

- A new way of overseeing research and innovation funding so that it is driven by the fundamental needs of our industry, rather than the priorities of academic research interests
- The creation of a "What Works" Centre for agriculture: effectively a one-stop-shop for all evidence and best practice of 'what works' in terms of technology, techniques, science and skills to provide a consistent accessible view to farmers, growers and their advisers of best practice
- The opportunity for AHDB to play a central role in co-ordinating knowledge exchange (KE) activities acting as the KE partner to Agritech Innovation Centres and working with private sector providers to ensure consistent, joined-up communication of best practice
- Better skills and training through a new skills framework and employer-led training curricula
- A significant ramping up of farmer to farmer learning and benchmarking to provide more accessible, on farm demonstration across all sectors and all parts of the country - effectively a series of innovation hubs where farmers learn from other farmers on the ground

It is essential that there is a shared ambition and focus in the arena of innovation, R&D KE and skills between Defra, BEIS DfE and industry delivery partners like AHDB, where considerable work has already been undertaken in these areas.

14. How important are the seven identified 'best practice' technologies (identified in paragraph 5.14) to enhancing productivity at the firm-level, and which offers the greatest return? Are there other technologies which offer greater potential?

AHDB take the view that whilst the technologies listed are important, they are not the technologies that will give the greatest return on investment in agriculture.

Improving productivity is largely about business having access to new technology that makes a difference to them rather than the technologies per se as businesses will choose the tech that is right for them. So anything that improves the 'visibility' of the benefits of new technology, or that encourages businesses to get involved in innovation themselves, should help boost productivity.

Key areas for technological advances in agriculture and horticulture include better capture and analysis of data through AI, Gene editing, precision farming and the technologies that will make this even smarter including remote sensing, advances in crop protection and in animal/herd health.

15. Do you have any examples, from the UK or internationally, of public or private sector approaches that have increased the adoption of best practice technologies or new to firm technologies?

There are examples to draw on elsewhere in the UK where joint investment between government and industry has bolstered the ability to improve dissemination of knowledge on farm such as the jointly managed AHDB/QMS monitor farms programme in Scotland, or Farming Connect advisory service in Wales, which works closely with AHDB on underpinning evidence and focus. In addition, there is also an opportunity to harness the food supply chain to disseminate knowledge. Grocery retailers are increasingly building close partnerships with suppliers and partners. Mechanisms such as Tesco's Supplier Network provide online platforms for sharing knowledge. AHDB is increasingly working with retailers and processors to support knowledge exchange programmes.

Assessments of different innovation systems across Europe enable some comparisons to be drawn. Innovation systems across Europe can be seen as weak/strong and fragmented/integrated. Strength reflects the relative investment across industry and government in knowledge exchange whereas integration reflects the extent to which there is coordination across different actors.

www.proakis.eu/sites/www.proakis.eu/files/AKIS_characterisation_briefing_final.pdf

Figure 3. An overview of European AKIS distinguished along a continuum from weak to strong and fragmented to integrated (as of 2014)

One of the agencies that works on the USDA missions is the National Institute of Food and Agriculture (NIFA). Its mission is to discover, translate, innovate and provide solutions. It does this through an 'Extension Service', utilising already existing knowledge transfer mechanisms at universities and colleges. With a total of 356 Land-Based colleges available to work through, NIFA focuses on gaining funding to research complex issues facing the industry. This research is used to educate schools and universities through training the potential future agriculture workforce. Finally, NIFA provide this knowledge and learned practices to the workforce in the agricultural industry to put the theory into practice.

16. What actions by the public or private sector would be most effective in driving effective adoption of new to firm technologies?

The factors associated with productivity are numerous but the evidence shows that those countries with the most coherent and integrated innovation pipelines are performing best. Although government has a part to play, we firmly believe that the solutions rest with industry to determine.
Proposed solutions include:

Research and Innovation

Developing a more effective way of overseeing funding to ensure that investment in agricultural innovation is targeted towards addressing the key constraints on agricultural productivity in the UK?

Creating a structure that ensures effective feedback loops are in place and that beneficiaries themselves have a greater say in setting the strategic direction for funding

Evidence base

Establishing a one-stop shop for authoritative evidence of what works. A network of seven independent 'What Works' centres and two affiliate members exist across policy areas such as health and policing, which receive public spending of more than £200 billion. The centres enable research commissioners and practitioners to make decisions based upon strong evidence of what works, and provide cost-efficient, useful services.

A "What Works" centre for agriculture and horticulture could assemble, produce and host recommended knowledge and evidence-based guidance, with:

- Scientific rigour, independence and objectivity
- Dynamic review of the available evidence
- Recommendations to connected funding bodies for research and dissemination through multiple channels

The charts above are taken from the FBS data. It highlights the importance of talking to other farmers, events and demonstrations and discussion groups and farm walks as a source of information and advice.

How do you access technical advice?

	Percentage of farm businesses (%)			95% Confidence Interval (%)		
	2007/08	2011/12	2016/17	2007/08	2011/12	2016/17
None identified	3	1	1	±1	±1	±1
Talking to other farmers	62	71	74	±3	±3	±3
Farming media	77	85	81	±2	±2	±3
Events and demonstrations	59	58	62	±3	±3	±3
Discussion groups and farm walks	47	51	43	±3	±3	±3
Advice supplied without charge	68	73	67	±3	±3	±3
Advice supplied at a charge	28	33	33	±2	±3	±3
RDP funded initiatives with a strong animal health theme		11			±2	
RDP funded initiatives with a strong technical theme		9			±2	
Performance indicators			40			±3

Source: Defra, Farm Business Survey, England 2007/08, 2011/12 and 2016/17.

How do you access business management advice?[(a)(b)]

	Percentage of farm businesses (%)			95% Confidence Interval (%)		
	2007/08	2011/12	2016/17	2007/08	2011/12	2016/17
None identified	18	5	9	±2	±1	±2
Talking to other farmers	39	60	43	±3	±3	±3
Farming media	54	75	61	±3	±3	±3
Events and demonstrations	34	49	45	±3	±3	±3
Discussion groups and farm walks	32	43	32	±3	±3	±3
Advice supplied without charge	58	59	63	±3	±3	±3
Advice supplied at a charge	19	26	32	±2	±3	±3

RDP funded initiatives with a strong business management theme	7		±2		
Growth hubs		4		±1	

Source: Defra, Farm Business Survey, England 2007/08, 2011/12 and 2016/17.

- Curricular Development for consultants and advisors and college lecturers

Coordinated knowledge exchange (KE)

Experience of other countries shows those with more integrated, coordinated KE frameworks stand a better chance of growing productivity. We see greater coordination to KE as a key part of AHDB's role but we can only do this through partnerships with other providers, such as farm advisors, rural colleges, universities and the supply chain Our sense is that the industry increasingly recognises the need to dramatically accelerate productivity growth to enable UK agriculture and horticulture to succeed in a post-Brexit world. And we sense the industry is ready to seize the opportunity afforded by the Industrial Strategy to create a new, dynamic partnership with government to achieve this.

The UK market for business support and advice services

17. What are the main reasons for businesses utilising or not utilising public and private business support?

18. How effectively is private and public business support provided in the UK?

Agricultural business support is highly fragmented in its co-ordination and delivery in the UK. The following chart from the FBS shows uptake of business management practices and compares 2016/17 with 2011/12. There has been a decline in many areas, with only benchmarking showing a significant improvement, although as the footnote shows, this is mainly due to a difference in the definition of benchmarking.

Business planning, benchmarking and management accounting practices

Which of the following business management practices ARE being carried out for your business (by you or a third party)?(a)(b)

	Percentage of farm businesses (%)		95% Confidence Interval (%)	
	2011/12	2016/17	2011/12	2016/17
No practices[(c)]	22	17	±3	±3
Attends discussion groups regularly	26	22	±3	±3
Informal plan	59	59	±3	±3
Formal plan	25	19	±3	±2
Produces budget, gross margins, cash flows, or in depth profit and loss accounts	25	33	±2	±3
Business-level benchmarking[(d)]	12	42	±2	±3
Enterprise level / balance sheet / international benchmarking[(d)]	7	21	±2	±3

Source: Defra, Farm Business Survey, England 2011/12 and 2016/17.

Based on responses from 1357 farm businesses in 2011/12 and 1269 businesses in 2016/17.

(a) Respondents could select more than one option.

(b) Results from the 2011/12 and 2016/17 business management practices modules are not directly comparable due to changes in the coverage of the survey and changes in the classification of farms.

(c) 'No practice means none of the practices specified in the question were selected.

(d) In 2016/17 active use of FBS feedback at both business and enterprise level was included as benchmarking. This means that the 2016/17 results cannot be directly compared to those for 2011/12, where this active use of survey feedback was not included.

19. Do you have any examples, from the UK or internationally, of approaches that have worked to increase the uptake of business support?

20. What actions by the public and private sector would be most effective to facilitate uptake of business support?

There are a number of actions that AHDB feel would be effective in driving uptake of business support. These include:

- Wider industry embracing a culture that promotes the need to raise productivity and advocates business support as key to succeeding in a competitive market environment.
- Industry aligning behind agrees universal performance metrics for each of the key farming sectors
- Bringing greater co-ordination across the public and private sector to knowledge exchange

21. Do you have further evidence of what forms of business support are more effective at improving firm level productivity?

The AHDB Cereals & Oilseeds knowledge exchange programme is known as the Monitor Farm programme (AHDB 2016b) and was initiated in Scotland in 2003, and England and Wales in 2014. The programme was originally developed in New Zealand to help farmers to "rapidly adapt to changes and become market focused" (ADAS, 2008).

The programme brings together groups of like-minded farmers to share, discuss and evaluate critical performance information to encourage and facilitate business improvement. The aim of the Monitor Farm programme is to facilitate business improvement with a focus on critical performance achieved by increasing efficiencies.

Phase 1 of the Monitor Farm programme in England & Wales has been effective in delivering business improvement with a focus on critical performance achieved by increasing efficiencies. These benefits have been realised on host farmers, in addition to within the wider agricultural industry.

The Monitor Farm programme has delivered environmental, technological, social, and CPD objectives. The programme has extended business networks through the facilitation of interaction between farmers and agronomists, seed traders, machinery manufacturers.

There is evidence that the focus of the programme could be widened where relevant, to promote cross-sector knowledge exchange opportunities.

73% of respondents reported implementing changes to their business. The majority of these changes focus around cost management and technical improvement specially related to changes in crop establishment systems.

22. What is the role of public sector in ensuring the uptake of private sector business support?

23. How can Government promote self-sustaining business support ecosystems, where firms seek and access information, advice and tools that improve their performance?

Summary

24. Do you agree that we are focusing on the right set of businesses? Do you agree that there are opportunities to increase productivity in the long tail?

AHDB feel that targeting those resources at top and middle performers will be more effective than targeting the long tail. It is debatable, however anecdotal evidence would suggest that many producers in the long tail are either unwilling or unable to make the changes necessary to remain profitable, and will, therefore, be removed through natural wastage. AHDB strategy is based on greater segmentation and targeting more activity towards the top two quartiles of farm performance.

There are significant benefits across sectors from targeting this section of performance as the examples below illustrate:

Sector	Total UK Numbers (hd)	Total UK Production	Est. value of raising average to top 25%
Dairy	1,890,000 hd	14,954,051,000 lts	£293,099,400
Suckler	1,700,000 hd	N/A	£179,520,000
Beef	2,000,000 hd	901,000 t	£240,000,000
Lamb	16,690,000 hd	307,000 t	£273,716,000
Pork	10,000,000 hd	919,000 t	£36,760,000
Wheat	15,163,000 t	15,163,000 t	£188,021,200
OSR	2,183,000 t	2,183,000 t	£61,124,000
Improved Margin			**£1,272,240,600**

In addition, there are environmental benefits to be gained from improved productivity:

	Top 25%	Average	Bottom 25%	Difference
Forage Area (ha/farm)	88.2	80.1	70	26%
Average No. cows	140.9	109.1	72.4	95%
Milk yield (kg/cow)	7,863	6,578	5,170	52%
Stocking rate (CE/ha)	2.27	2.10	2.00	14%
Enterprise output (£/cow)	2,139	1,785	1,390	54%
Gross Margin (£/cow)	1,068	893	639	53%
GHG Emissions ($kgCO_2e/kgECM$)	**1.10**	**1.31**	**1.65**	**-32%**

25. Are there any other firm-level factors that we should be focusing on, that are not covered in this call for evidence?

Many farmers and growers will be familiar with measures of productivity such as wheat yield per hectare, milk yield per cow and so on. However, focusing on these specific units of productivity can mask the bigger picture. For example, increasing wheat yields through using more fertiliser may impact on the natural environment. Ultimately, improving our industry's productivity has to play a part in improving the farmed environment. Greater efficiency with which the industry uses resources like energy and water can have an impact on the environment. In addition, good environmental stewardship of our soils, water and air helps to improve the natural capital that underpins productivity growth.

26. Where do you think the main opportunities are for the UK to drive business productivity growth?

The UK agricultural industry has come together via the FDSC Agricultural Productivity Working Group and have produced the following initial thoughts on the main opportunities to drive agricultural productivity:

1) **Use a range of stakeholders to agree universal performance metrics** against key standards for each sector

2) **Develop methods of collecting data** from a range of sources to understand and influence performance, ensuring that as much as possible of this data collection is automated. Use this data to **deliver benchmarking** which is fundamental to a correct business focused appraisal of each farm which will inform future actions.

3) **Agree the key targets for each sector**, agreeing the menu of actions which are necessary and drawing up a resource bank, a communication plan and a range of agreed messages which are to be shared by all in the supply chain. These targets will also include a focus on future consumer demand at home and abroad.

4) **To scope and develop a completely re-engineered Agricultural Knowledge and Innovation System** by building connectivity through the research to application supply chain and mobilising the research effort to deliver against the agreed performance targets identified above. This will have a major focus on international/competitor insights and case studies and will place a strong emphasis on what can we learn from the best around the world. It will also seek to increase the understanding of the competitive challenge facing our industry. This programme will have a major focus on face to face, peer to peer and digital learning.

5) **Intentionally change the language around farming, creating motivational messages** which change the farmer's perception of what successful farming looks like, with the key areas to be promoted including business focus, data gathering, benchmarking, continuous learning, use of external advisors, uptake of new technology, membership of development/discussion groups. All

messaging will come in a range of formats and there will be a menu of options from which farmers can choose, creating a situation where the farmer retains managerial control, but still be guided and advised.

6) **Creation of a 'What Works Centre' to simplify access to tailored knowledge** to dynamically update the state of the art a develop a robust evidence base to inform best practice, CPD, quality assurance and regulation

    - This *'What Works Centre'* for agriculture and horticulture would provide a searchable technical document store and a flexible data library on which a *Digital Tools Suite* will draw.
    - Research data will be linked with on-farm trials and business benchmark data, providing the infrastructure required to ensure a dynamic and flexible system

7) **Increase visibility of new technology to farmers,** showing the key long-term benefits and the implementation steps in using it through an improved infrastructure for demonstration and peer-to-peer learning.

8) **Increase the focus on delivering implementation of R&D** ('Mission Driven R&D') as part of the R&D programme itself with the key aim of accelerating uptake of best practice. As part of this, to create a way of 'de-risking' farmer led innovation using an 'innovation accelerator'.

9) **Create a pathway to recognition of professional farming**, valued by the industry, the public and those considering a career in agriculture. To this using tailored and enhanced CPD that farmers find useful, applicable and beneficial to their businesses. In order to be successful, this demands a coherent skills strategy towards professionalisation and lifelong learning as well as the centralising of infrastructure to deliver it.

10) **Support payments to focus on improved business and environmental performance,** linking support to continuous professional development, farm business planning, productivity enhancing activity and activity which protects or enhances the environment.