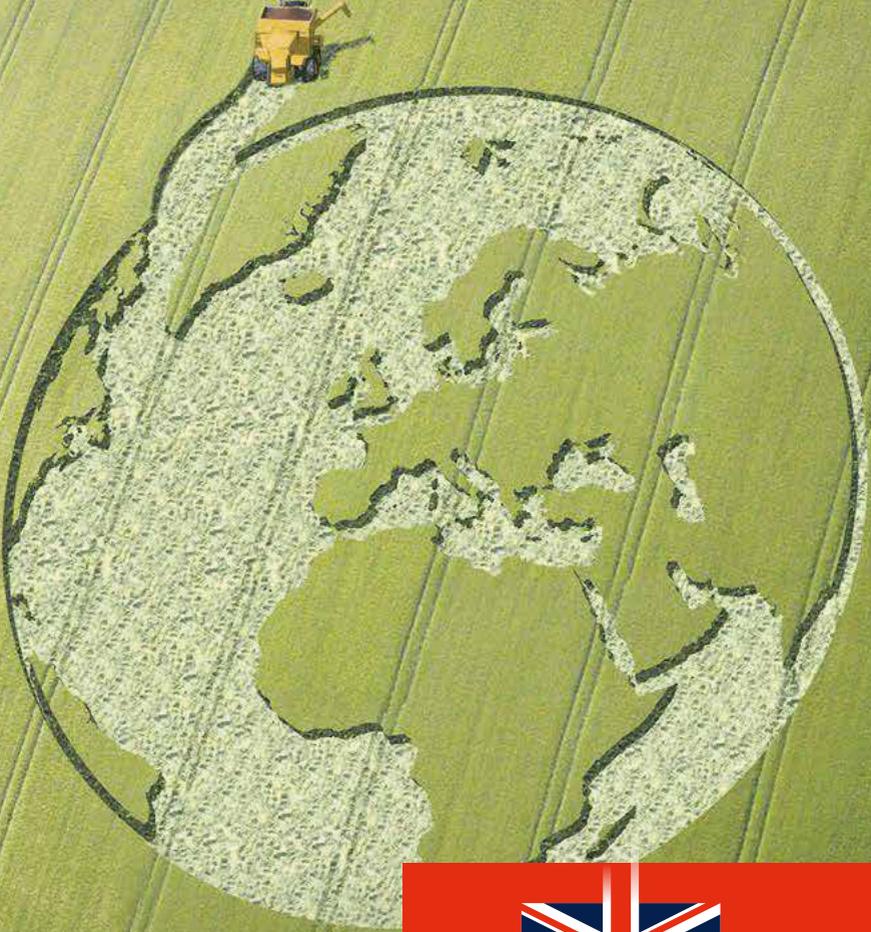


UK Capabilities in the Agri-Tech Sector




GREAT 
BRITAIN & NORTHERN IRELAND

9.1bn

Estimated global population
that will need feeding by 2050

Food and Agricultural Organisation (FAO)





Welcome to the home of Agri-Tech innovation

Agri-Tech is any technological or science-based innovation utilised to improve the productivity and sustainability of agriculture, horticulture, aquaculture and forestry, including on-site storage and processing of food and non-food products. In addition, Agri-Tech includes pet care and horses.

A growing population puts more pressure on our natural resources. A key role for agri-tech is to drive increased agricultural productivity/yields in a more sustainable way with less impact on the environment, as well as reduce wastage through the supply chain.

Farmers need innovative technologies and practices to produce more food from a range of different agricultural production systems. The UK can provide effective and innovative solutions based on expertise and historic strengths across a wide range of agricultural production systems. Academia and research centres work closely with Agri-Tech companies to develop and commercialise innovative technologies to meet real world needs, while scientific breakthroughs in nutrition, genetics, informatics and big data, remote sensing, engineering, robotics and meteorology are also playing a part in transforming traditional agricultural practices.

From the world's first automated, long-term measurement device for monitoring pH and temperature in dairy herds, to a partnership between Pepsi UK and Cambridge University that uses a web-based platform to ensure sustainable and efficient water use in crop management, many projects and innovations are cementing the UK's status as a global hub for Agri-Tech.

This brochure provides an overview of the UK's Agri-Tech capabilities. If you're a government or organisation interested in sourcing the UK's world-leading Agri-Tech products and expertise, this is the right place to start.

Agriculture and fishing sector
in 2014 employed 440,000
people, utilised 71% of UK
land and contributed £10.7Bn
Gross Value Added (GVA) to
the UK economy

British food and farming at a glance, Defra



A fast-growing sector

Agri-Tech is a fast-growing industry in the UK with new technologies coming onto the marketplace all the time.

Agriculture in the UK employs nearly half a million people and contributes £9 billion to the UK economy, while the wider agri-food supply chain is worth £106 billion with 4.5 million employees (Source: Defra). This domestic marketplace is increasingly embracing new technologies such as precision agriculture in order to drive efficiency and increase yields – helping to boost the entire Agri-Tech knowledge base and innovation culture in the UK.

UK companies are enthusiastically embracing the global opportunities in the Agri-Tech marketplace. Global market sizes for some existing technologies are well established, but there are also many new and less easily measurable opportunities across the Agri-Tech sector; and of these many are increasing rapidly. For example, the crop and livestock care markets are predicted to grow at 10% a year, while markets for precision agriculture and bio-pesticides (an alternative to chemical pesticides) are growing at 15-20%. UK firms are world leaders in both these areas.

A thriving and competitive UK market means that there is a constant stream of innovation.

A world-class, commercially focused research environment

The UK is renowned for world-class Agri-Tech R&D as well as our proven ability to develop and take new products and solutions to market.

UK institutes and universities have a long association of working closely with the industry to translate agricultural research, innovations and new technologies into commercial propositions.

Generous tax incentives for R&D support the commercialisation of innovations. The UK Strategy for Agricultural Technologies was developed by the UK government, in partnership with industry and academic institutions, to identify and develop the opportunities and strengths of the Agri-Tech sector. It helps to transfer world-leading research into commercial applications.

The UK's long history of international trading and its science and technology industries continue to attract the brightest talent from around the world. This means that companies in the UK are international in outlook, creating and adapting Agri-Tech solutions to all regions rather than focusing solely on the domestic marketplace in the UK.

The wider culture of innovation in the UK is being bolstered in the Agri-Tech sector by government investment to help create more cutting-edge products and services for different markets across the world.

“UK companies and universities are particularly adept at taking satellite data and using it to solve business challenges faced by other sectors.”

Magellium Ltd (France) working with the Satellite Applications Catapult



A testing ground for progressive farming systems

The UK Agri-Tech sector has a progressive farming supply chain where integration, innovation and investment are standard. The agricultural community has a culture of adopting new technologies and best practice across all areas of precision agriculture.

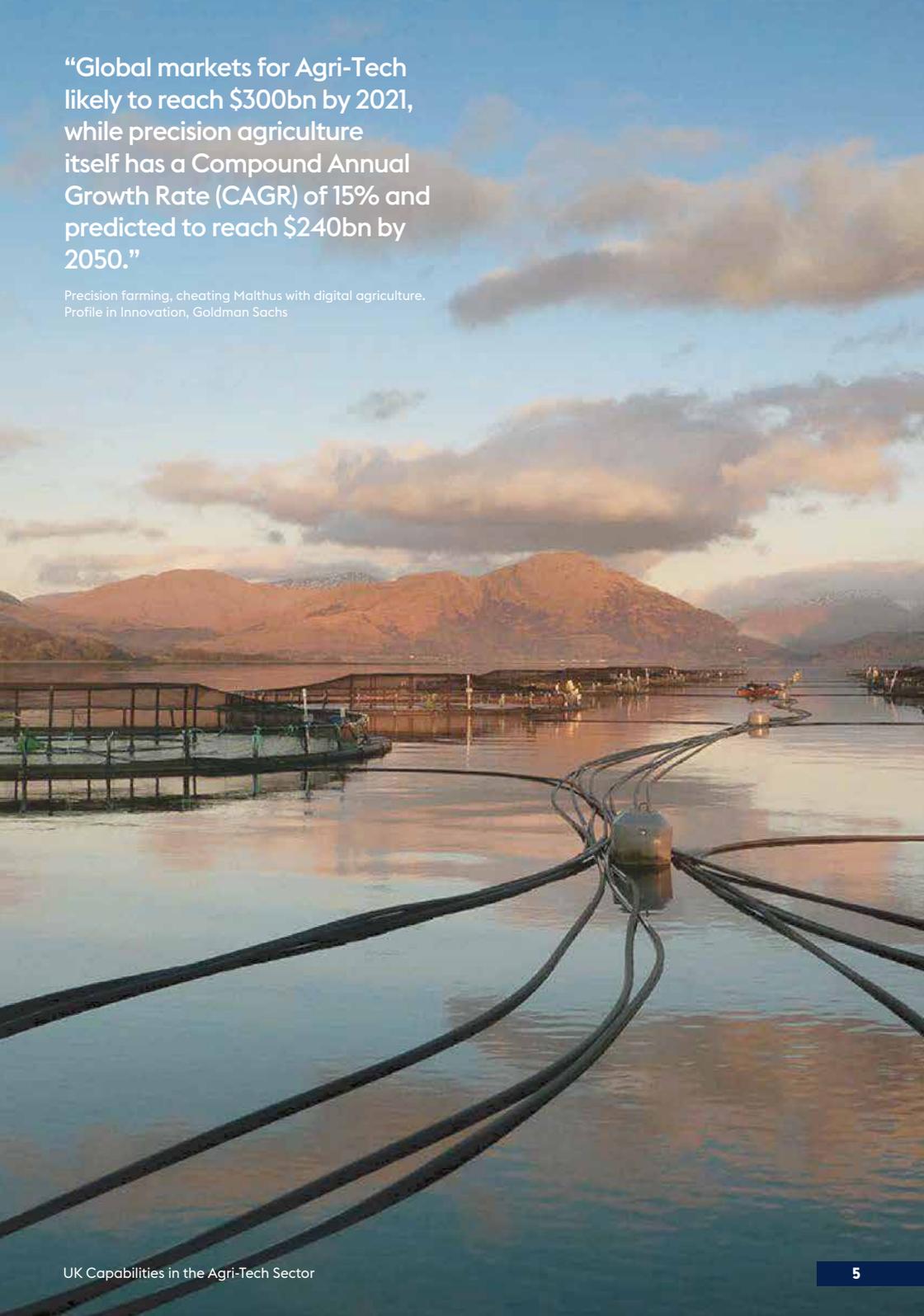
Key technologies being adopted by UK farmers include GPS steering systems, robotic milking machines, smartphones, combine yield mapping, GPS soil analysis, variable rate fertilisers, cow heat detection devices, crop sensors, aerial drones, electronic ear tags, farm management software and robotic livestock feeders.

It puts the UK at the forefront of developing new technologies, products and services.



“Global markets for Agri-Tech likely to reach \$300bn by 2021, while precision agriculture itself has a Compound Annual Growth Rate (CAGR) of 15% and predicted to reach \$240bn by 2050.”

Precision farming, cheating Malthus with digital agriculture. Profile in Innovation, Goldman Sachs



UK Agri-Tech capabilities

Agri-Tech in the UK covers a wide range of sub-sectors including plant science, animal science, precision agriculture and aquaculture in which the UK is leading the way.



Plant Sciences

The UK is a world-leader in the scientific study of plants, including their growth, structure, physiology, reproduction, ecology and pathology. The UK is also at the forefront in using the latest farm management systems to optimise economic returns.

Through the development of new and improved crop varieties, crop yields can be increased to meet growing demands for food, animal feed, fuel and other products for the bio-economy. Innovation in horticultural, arable and bio-energy crop production is developing new plants with high yield, quality and value to enable growers to meet the needs of their customers.

No. 1

The UK ranks first in Europe for plant science publication impact

UK Plant Sciences Federation (UKPSF)

Some examples of world-class projects from UK companies include:

- The large-scale production in Canada of purple tomatoes developed by the John Innes Centre, with the same compounds found in blueberries and cranberries. This new type of tomato offers health benefits and improves the nutritional value of food products from ketchup to pizza toppings.
- Beneforté 'super broccoli', sold in UK supermarkets, was developed by the John Innes Centre, Institute of Food Research and Plant Bioscience Ltd. Conventional breeding methods were used to give higher levels of a key phytonutrient linked to health benefits (lower rates of heart disease and some types of cancer).
- It's Fresh, developed by Food Freshness Technology, is a simple pad which absorbs and locks away ethylene gas, the natural plant ripening hormone. This radically slows the ripening and decay of fresh fruit, vegetables and flowers in the supply chain, reducing waste and assuring consumer product quality. The technology is already used in the retail supply chain (Tesco, Marks & Spencer).



Using animal science to boost productivity and welfare

The UK is world renowned not just for its animal science but, also with proven ability to develop and bring new animal products and solutions to market with commercial partners.

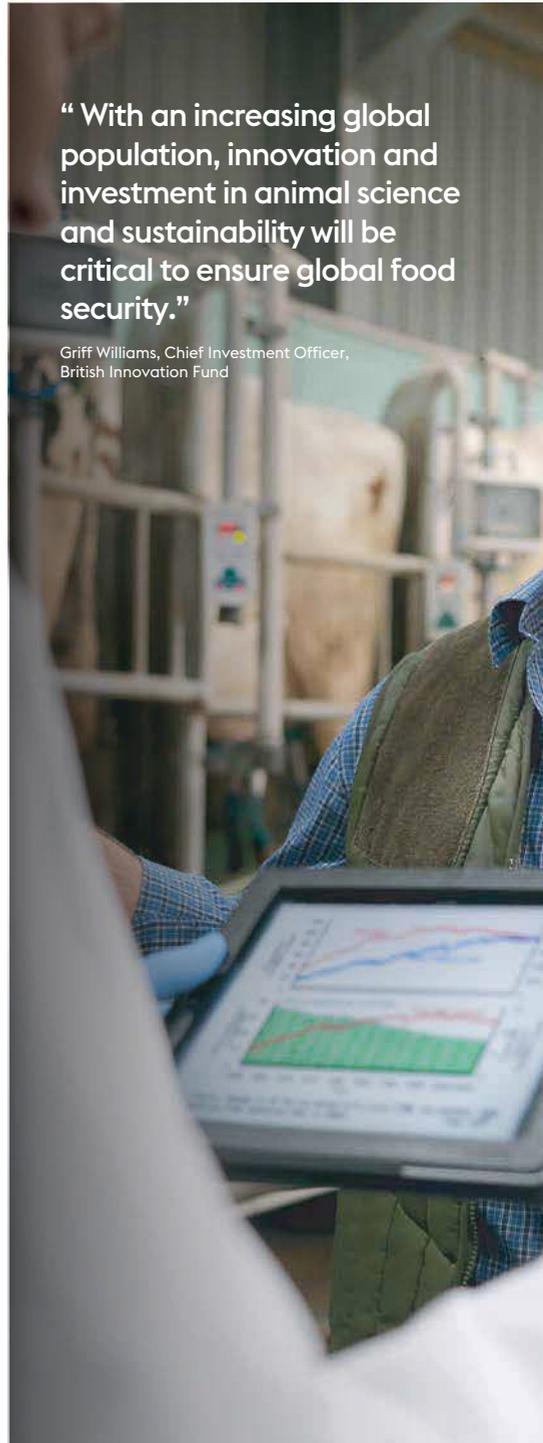
The scientific study of basic animal physiology, developmental biology, reproduction, neurophysiology, behaviour, bioethics, nutritional sciences, and biochemistry is critical to improving the productivity of livestock and the wellbeing of companion animals. UK animal science is contributing to improvements in the efficiency of livestock production systems, as well as the welfare and productivity of farm animals to help produce quality, safe and environmentally-sustainable food for a growing world population.

The UK has an outstanding track record in these areas, for example helping with the global eradication of rinderpest (cattle plague). The UK is also a key exporter of animal breeding stock (beef, dairy, pigs and poultry) and manufacturer of new robotic milking systems.

One of the critical factors in the UK's world-class expertise in animal science is the education system. The UK has eight veterinary universities: Bristol, Cambridge, Edinburgh, Glasgow, Liverpool, London (Royal Veterinary College), Nottingham and Surrey; of which five are in the top six veterinary schools in Europe (QS University Rankings).

“With an increasing global population, innovation and investment in animal science and sustainability will be critical to ensure global food security.”

Griff Williams, Chief Investment Officer,
British Innovation Fund





Top 10 Veterinary Schools in the World

- | | | |
|----|--|----------------|
| 1 | University of California, Davis | United States |
| 2 | Cornell University | United States |
| 3 | Royal Veterinary College, University of London | United Kingdom |
| 4 | University of Guelph | Canada |
| 5 | Utrecht University | Netherlands |
| 6 | Texas A&M University | United States |
| 7 | University of Glasgow | United Kingdom |
| 8 | University of Cambridge | United Kingdom |
| 9 | University of Edinburgh | United Kingdom |
| 10 | University of Liverpool | United Kingdom |

QS University Rankings

This educational excellence, alongside many specialist scientific research institutions, has created an outstanding R&D culture, which has helped deliver many innovative products. Some highlights include:

- A genetic chip developed by the Roslin Institute and the University of Edinburgh, Stirling and Glasgow, Affymetrix UK, and Landcatch Natural Selection. This chip contains the genetic code for salmon to allow breeders to detect fish with the best genes.
- The Well Cow Smart Sensor, the world's first automated, long-term measurement device for monitoring pH and temperature in dairy herds, has been developed by Well Cow Ltd. and Silsoe Research Institute and will allow farmers to optimise diets for their cattle and prevent the occurrence of sub-acute rumen acidosis (SARA) to improve milk production.
- Cow collar to detect oestrus by monitoring increasing activity levels has been developed by ETS, Scottish Agricultural College, NMR plc, The Harbro Group Ltd, eCow, Morrisons Supermarkets plc and University of Strathclyde. It alerts the farmer in real time with information transmitted via a wireless sensor network to a computer or mobile phone.



More efficient farm operations with precision agriculture.

Precision agriculture uses satellite position data, remote sensing devices and proximal data gathering technologies. It enables an information-based decision making approach to farm management to optimise returns.

Precision technology is already widely used in the UK to help improve the efficiency of farm operations, including cultivation and better-targeted fertiliser and agrochemical applications.

This process helps to save on the use of fertilisers and sprays, reduce fuel costs, and improve soil structure. The UK has some of the world's most pioneering and longest-running agricultural experiments, charting the long-term effects of agricultural practices, and a changing environment on crops, soils and farmland ecosystems.

Precision farming and engineering is one of the fastest growing Agri-Tech subsectors. It is already worth over £1 billion to the UK economy and employs 21,000 people. Agricultural robotics are now being developed to drive tractors, kill weeds with lasers to avoid using chemicals, pick and grade strawberries, mow grass, scout for pests, weeds and diseases, and plant seeds.

This new wave of smart machines will revolutionise the way in which crops are grown in the future by using intelligently targeted inputs. Hi-tech areas like this are expected to expand as the core agriculture sector continues to seek efficiency improvements and adopts new technologies. The UK's limited land supply and growing environmental and climate change challenges highlight a continuous need to improve efficiency in agriculture, driving the implementation of innovative farming practices, and investment in cutting-edge technologies. Examples of new technologies developed in the UK include:

- i-crop™ is a web-based revolutionary crop management system, developed by PepsiCo UK in partnership with Cambridge University. It brings together data drawn from soil moisture probes in the fields and the local weather station to help farmers make informed decisions about when to irrigate and how much water to use, to produce more by using less water.
- Garford Robocrop, developed by Tillett and Hague Technology in-row and inter-row vision guidance systems, enables mechanical weeding of crops and reduces the reliance on herbicides and hand weeding. This is beneficial for the environment and reduces the manual labour required to grow organic crops.

These are just a few of the new innovative agricultural technologies being developed in the UK which can help farmers worldwide make farming more efficient and profitable.

UK Capabilities in the Agri-Tech Sector

Aquaculture

Aquaculture has been the fastest growing food production sector for more than 40 years, producing over 50% of the fish consumed by humans across the world. Scotland is home to a thriving aquaculture sector whose products are highly regarded for their provenance, superior quality and the integrity of the supply chain. Aquaculture in Scotland is diverse, from the farming of salmon and other finfish species, to the production of mussels and oysters, to the harvesting of seaweed. As the aquaculture industry has grown, so too have the businesses that supply goods and services to fish and shellfish farmers. These companies provide engineering solutions, farm services, fish health and feed solutions.

Scotland's aquaculture strengths are significant and collaborative working between the aquaculture industry and Scotland's academic and research communities supports the development of this innovative sector through multi-disciplinary approaches to problem solving.

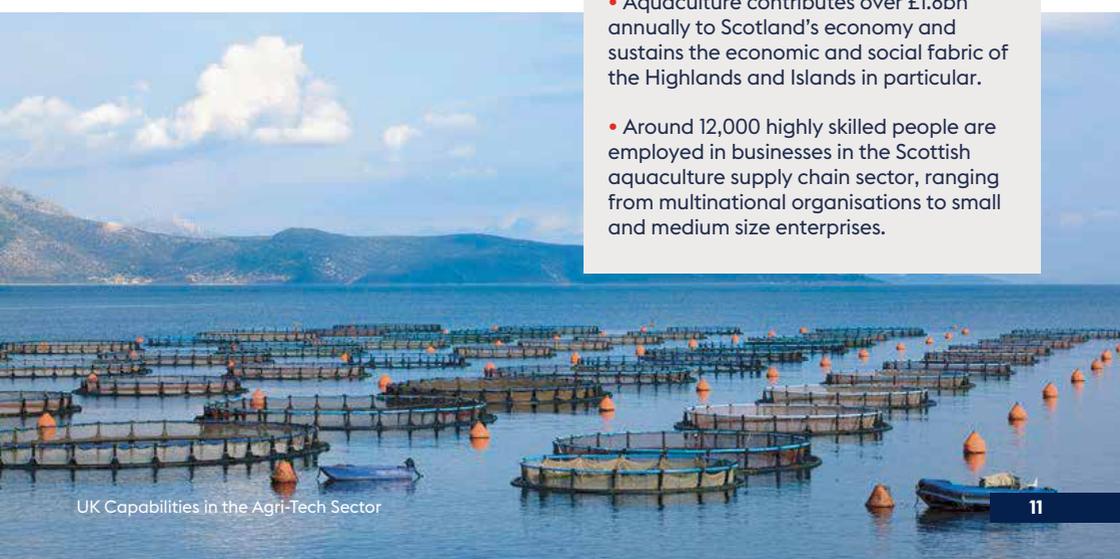
As a prime example, Highlands and Islands Enterprise has co-funded a trial alongside the European Maritime and Fisheries Fund, which brings together the Scottish Aquaculture Innovation Centre, University of the Highlands

and Islands and The Scottish Shellfish Marketing Group to create an experimental mussel hatchery looking at the commercial feasibility of producing seed mussels. If successful, this pilot in Shetland could lead to the creation of Scotland's first commercial mussel hatchery.

The Scottish Aquaculture Innovation Centre (SAIC) aims to transform the relationship between the aquaculture industry and research community by generating closer connections between these two communities to foster innovative industry-relevant collaboration.

Some facts:

- Scotland is the largest producer of farmed Atlantic salmon in the EU and the third largest globally with a worldwide retail value of £1 billion. Salmon farming contributes around half a billion pounds to the UK economy each year.
- Scottish farmed salmon has held the French Government's top quality award, Label Rouge, for the past 22 years. It was the first non-French food to receive this accolade.
- Aquaculture contributes over £1.8bn annually to Scotland's economy and sustains the economic and social fabric of the Highlands and Islands in particular.
- Around 12,000 highly skilled people are employed in businesses in the Scottish aquaculture supply chain sector, ranging from multinational organisations to small and medium size enterprises.





5 reasons to trade with the UK Agri-Tech sector

1. World-class science

With highly-skilled talent in many sub-sectors of Agri-Tech, the UK has a proven ability to develop and bring to market new products with commercial partners.

2. Progressive farming and food supply chain

With the UK's food manufacturing and retail sectors introducing innovation to drive productivity increases, environmental improvements and meet consumer demand.

3. Dynamic business environment

The UK has a competitive pricing and tax/tariff environment and stable reliable supply chains.

4. Commercial help and support

A range of focused schemes and advice to help find and trade with Agri-Tech companies.

5. Access to UK Export Finance

UKEF managers provide free and impartial consultations with access to flexible services including local currency options, project finance, reserve-based lending and public-private partnerships.

Department for International Trade

The UK's Department for International Trade (DIT) has overall responsibility for promoting UK trade across the world and attracting foreign investment to our economy. We are a specialised government department with responsibility for negotiating international trade policy, supporting business, as well as delivering an outward looking trade diplomacy strategy.

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Published by
Department for International Trade
December 2021

