



NUFFIELD
Farming Scholarships



TECHNOLOGY

Technology adoption for sustainable farming;

A Bitesize Guide

INTRODUCTION

Each year, up to 25 people aged 25-45 are selected as scholars and sponsored by the Nuffield Farming Scholarships Trust to travel, research and report on subjects they are passionate about and which contribute to advancing farming, food, horticulture, forestry and ancillary industries.

These studies bring new thinking, technology or management approaches from across the globe to the UK. While many know of Nuffield Farming scholarships, few people in the industry are aware of the huge knowledge base of global reports, dating back to 2006, that can be accessed via the online Nuffield Farming library.

This Bitesize Guide, supported by the Elizabeth Creak Charitable Trust, Central Region Farmers Trust, Gloucestershire Agricultural House Foundation and the Royal Agricultural Society of England, gives an insight into the practical experiences and research freely available at:



<https://www.nuffieldscholar.org/reports>



WHAT IS THIS GUIDE, AND HOW SHOULD I USE IT?

This Bitesize Guide on 'Technology adoption for sustainable farming' is designed to provide a range of ideas to help anyone who is interested in some of the new technologies being developed and used which will help make agriculture more sustainable.

Gathering key learnings from Nuffield scholars, this publication takes an expansive view of technologies for sustainable agriculture, whether it's an explanation of key technologies, what to opt for and what to avoid, to specific practical examples of technology use in different sectors.

It's a broad topic, and this Bitesize Guide brings together research, discussions and ideas from relevant Nuffield Farming reports, all highlighted as 'Talking points' and 'In practice' sections, with 'Putting it into action' sections at the end which includes useful links. The Guide features short, thought-provoking extracts - each one includes a TinyURL link and QR code to access the relevant Nuffield Farming report for more information, case studies and discussions.



TALKING POINT 1:

Technology, agriculture and sustainability

Edward Towers NSch 2021



Globally farmers are at the heart of sustainability efforts.”

Managing much of the world’s habitable land, farmers have an opportunity to play a unique role in enhancing biodiversity, sequestering carbon, and improving water quality, alongside efficiently nourishing the population. Emerging technologies like blockchain, IoT, and AI hold significant potential to improve farming and support environmental goals, yet these tools can either empower farmers or risk diminishing their autonomy depending on how they’re applied.

Carrot: Technology as a tool to incentivise sustainable practices

When used as an incentive, technology can empower farmers by creating measurable, marketable environmental assets. IoT sensors can monitor soil health or carbon sequestration, AI can optimise inputs, and blockchain can verify sustainable actions, creating new revenue streams through assets like carbon credits or biodiversity tokens. By turning environmental stewardship into an economic asset, these technologies reward farmers for sustainable practices and reinforce their role as active agents in the fight against climate change.

Stick: Technology as a means for regulation and compliance

Conversely, if these technologies are applied primarily for regulatory enforcement, they risk becoming tools of external control, reducing farmers’ autonomy. IoT devices could be mandated to monitor farm emissions or water use, and blockchain could track every input, potentially turning farmers into “land-owning caretakers” bound by mandates without real agency in their practices.

As these technologies continue to develop, it’s essential to ensure they empower farmers and contribute to fair, economically viable pathways toward sustainability. Rather than enforcing top-down control, technology should enable farmers to leverage their expertise and connection to the land, recognising them as indispensable partners in achieving environmental goals.



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Putting it into action



While technology presents promising solutions, challenges remain in scaling these innovations and ensuring adoption among both farmers and investors. The real challenge is ensuring that the entire system - policies, markets, financial structures, and cultural norms - supports sustainable, long-term success rather than rewarding short-term extraction.



Edward Towers

“ ***These technologies reward farmers for sustainable practices and reinforce their role as active agents in the fight against climate change.*** ”



The integration of new technology to incentivise environmental services:

<https://qrco.de/bgVc8G>



TALKING POINT 2:

Issues with new technology adoption

Dr Edward Thomas Jones Nsch 2020



History indicates that the agricultural industry's adoption of new technologies often leads to uneven distribution of benefits, leaving some farmers disadvantaged. The advantages of this type of change are frequently captured by technology companies and large farms, with smaller farms rarely benefiting.

The Fourth Agricultural Revolution might leave farmers without ownership or full access to their farm's data from new technologies, or force reliance on third party companies for maintaining crucial, complex machinery: The new revolution could create unequal power dynamics. I found that some farmers were optimistic about a high-tech future. But others wondered whether those with less capital, poor broadband availability and IT skills, and access to advice on how to use the technology would be able to benefit.

A dairy farmer told me that using robots had improved his work-life balance and allowed a farm worker to avoid dextrous tasks on the farm. But they had also created a different kind of stress due to the resulting information overload and the perception that the farmer needed to be monitoring data 24/7. There are also the potential risks or unintended consequences of certain technologies. For example, they may be concerned about the environmental impacts of certain agritech practices, or about the potential for agritech to disrupt traditional farming practices or to disadvantage small farmers.

On the whole, farmers view new technologies as a way to improve the efficiency and productivity of their operations, and to address challenges such as food security and sustainability. Some farmers see agritech as a way to increase their profitability and competitiveness, by using technology to optimise their farming practices and reduce their costs. Others view agritech as a way to address specific challenges or needs, such as the need for more sustainable farming practices or the need to adapt to changing weather patterns.



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Putting it into action



To encourage adoption, farmers need to be involved in agritech innovation from the start: Their unique knowledge, usually handed down from generation to generation, ensures the technology developed is suitable and adaptable. A farmer's decision to use agritech hinges on their goals and priorities, with sustainability-minded farmers favouring eco-friendly technologies. Overall, many farmers are interested in using new technologies to improve their operations and increase yields, but they want to make sure they are making informed decisions that will benefit their farm and community in the long term.



Dr Edward Thomas Jones



Are we making the right investments?: <https://qrco.de/bgVcES>



TALKING POINT 3:

The Internet of Things

Edward Towers NSch 2021

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Putting it into action







Many harmful practices and environmental services are largely invisible and difficult to measure; for example, emissions released or sequestered from farmland are difficult to see or measure.”

This lack of visibility limits credibility, making it challenging to prove that these benefits are real and consistent. Without reliable measurements, investors and stakeholders hesitate to support environmental projects due to doubts about their impact.

The Internet of Things (IoT) is a system of devices that are connected to the internet or a local network. These devices collect data from the environment and communicate with each other, often through cloud-based platforms where data can be stored, processed, and analysed, with or without human intervention.

IoT has revolutionised many industries by providing a continuous stream of information that can be used to monitor and optimise processes, and it has a significant role to play in environmental monitoring and sustainability. Technologies like sensors and satellite imaging can make these benefits visible, providing the measurable proof needed to build trust and attract investment. These devices include sensors embedded in soil, weather stations, microphones, phones and drones to satellites in orbit - all with the capacity to transmit data in real time, sometimes 24/7.

How IoT works

 <p>Connectivity</p>	<p>IoT devices are connected to a network, allowing them to communicate with each other and with central data systems.</p>
 <p>Data Collection</p>	<p>Sensors embedded in IoT devices collect various types of data, such as temperature, humidity, light levels, soil moisture, air quality and more.</p>
 <p>Data Processing</p>	<p>The data collected by IoT devices can be processed and analysed to extract valuable insights.</p>
 <p>Automation</p>	<p>IoT systems can be designed to automate certain processes based on the data they collect, improving efficiency and reducing human intervention.</p>



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Putting it into action

In agriculture, IoT can be used to improve sustainability by optimising resource use and reducing environmental impact methods include:

Informed decision-making	IoT provides accurate, real-time data that can be used to make informed decisions about resource management and environmental practices.
Increased efficiency	By automating certain processes and providing data-driven insights, IoT can increase efficiency, reducing waste and energy consumption.
Enhanced traceability	IoT data can be used to create a traceable record of environmental services, ensuring transparency and accountability in sustainability initiatives.
Early warning systems	IoT can detect changes in environmental conditions, providing early warning systems for events like droughts, floods, or pest outbreaks, allowing for proactive responses.
Examples	
In-field sensors	IoT sensors in the field can monitor soil moisture levels, enabling precision irrigation that conserves water. IoT devices can also track the health of crops, allowing farmers to identify and address issues before they become serious problems
Satellite-based monitoring	Satellites equipped with IoT technology can monitor large areas, providing data on the green area index, land use changes, and deforestation rates. This data can help identify areas at risk and track the success of reforestation projects.
Soil and water sensors	IoT sensors placed in soil or water sources can measure moisture levels, nutrient content, and contamination, allowing farmers to optimise irrigation and fertilisation while reducing waste and environmental impact.
Air quality monitoring	IoT devices can monitor air quality in real time, providing data on pollutants and greenhouse gases. This information can be used to assess the environmental impact of agricultural practices and to implement corrective measures.
Biodiversity tracking	IoT devices can be used to monitor wildlife activity and biodiversity, providing insights into the health of ecosystems and the impact of human activities.

On my travels I visited various tech savvy farming businesses using IoT devices to optimise their resource use efficiency, such as Soilmentor in Chile (see next page).

Case study: Soilmentor, Chile

Soil health has traditionally been difficult to quantify, making it challenging for farmers to track improvements over time.

Soilmentor from Vidacycle, Chile, provides a solution by offering a set of soil health indicators that farmers can measure and track using simple field tests and digital tools. It helps monitor aspects such as soil structure, earthworm activity, infiltration rates, and organic matter levels.

By transforming raw observational data into structured insights, Soilmentor reduces complexity, allowing farmers to make informed decisions about soil management. This aligns with the broader goal of turning complex environmental processes into measurable and actionable metrics.



The integration of new technology to incentivise environmental services:

<https://grco.de/bgVc8G>



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Putting it into action

TALKING POINT 4:

AI in sustainable agriculture

Edward Towers NSch 2021

AI can play a significant role in promoting sustainability in agriculture by enabling more precise and efficient practices. Here are some key applications:

Precision agriculture	AI can analyse data from IoT sensors to optimise resource use. For example, AI algorithms can determine the optimal amount of water and fertiliser for crops based on soil moisture levels and nutrient content, reducing waste and environmental impact.
Predictive analytics	AI can use historical data and real-time information to predict weather patterns, crop yields, and disease outbreaks. This helps farmers make proactive decisions to minimise risks and optimise production.
Monitoring and management	AI-powered drones and robots can monitor crops and livestock, detecting issues like disease or pest infestations. This automation reduces the need for chemical interventions and supports more sustainable practices.
Supply chain optimisation	AI can analyse data across the agricultural supply chain to identify inefficiencies and suggest improvements. This can lead to reduced waste and a more sustainable distribution system.
Sustainability assessment	AI can process large datasets to assess the environmental impact of agricultural practices, helping farmers and stakeholders make informed decisions about sustainability.
Enhanced efficiency	AI can help optimise agricultural information processes, reducing physical paper-based waste, increasing productivity and offering more time for efficient data driven information exchange and access.
Improved decision-making	AI's predictive capabilities enable farmers to make data-driven decisions that support sustainable information, creating more mental space for progressive decision making outside AI capabilities.
Reduced environmental impact	By optimising resource use and reducing the need for chemical interventions, AI can contribute to a smaller environmental footprint.
Predict environmental trends	AI can analyse historical and real-time data to predict environmental trends, providing insights that can inform sustainability strategies.



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Putting it into action

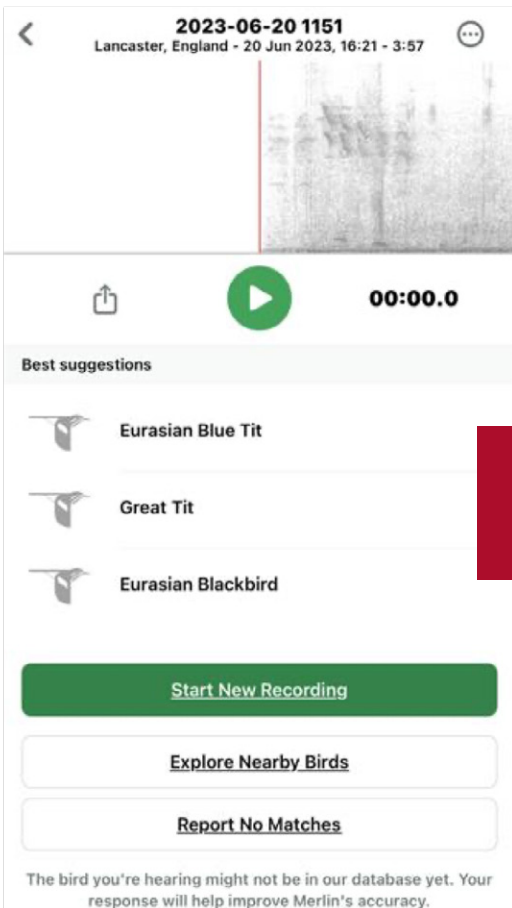
Case study: AI and the Merlin Bird ID app

The Merlin Bird ID app, developed by the Cornell Lab of Ornithology, showcases how IoT technology can enhance environmental monitoring.

By using a smartphone's microphone and AI-powered sound recognition, the app identifies bird species in real-time, providing valuable data on biodiversity and ecosystem health.

This demonstrates how IoT can make invisible environmental indicators measurable, supporting conservation efforts and potentially playing a role in verifying biodiversity-based environmental incentives.

Birds are an incredibly useful biodiversity proxy as they have the opportunity to relocate and fly elsewhere if the conditions aren't suitable.



The Merlin Bird ID app, which can be downloaded using the QR codes above

“ AI can contribute to a smaller environmental footprint.”

 The integration of new technology to incentivise environmental services: <https://qrco.de/bgVc8G>



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Putting it into action

TALKING POINT 5:

What technology to adopt and what to avoid

Michael Ratcliffe NSch 2017

Cool doesn't mean useful or profitable

In a competitive industry such as agriculture, it is important that we pursue advancements that increase the profitability of our farms. This does not however mean that we need really impressive machinery and technology to achieve this goal.

Data does not mean valuable

We are in the age of internet-connected devices. It has never been cheaper to collect vast amounts of data and agriculture - like many other industries - is going to be filled with devices for measuring things that are useful. It is also going to be flooded with devices that measure non-useful things. As a farmer you know what information is useful to you and what is not, but if you're struggling with it a good thing to keep in mind is: "Can I act on this information or is it interesting to my customers"? If you can't act on it then having the data is not useful to you today.

Using one of the glasshouse producers I visited as an example, Denis has many sensors that allow his automation system to function or are useful to his farm management. Sensing wind speed allows him to automatically close the roof vents if the wind speed is likely to damage the glasshouse. Such sensors commonly come with a wind direction indicator as well. However, knowing the direction is not important, so he didn't invest/implement wind direction into his system.

Technology should be used to make your life easier

So you have found a technology that adds value in the areas you care about. How much of your time do you want to spend turning this data into an action? Ideally you want the data to be in a useful format that you can quickly access and act on. A million-cell Excel spreadsheet of humidity in your greenhouse is not easy to act on: but an app that shows you the current and daily min/max humidity readings is much more useable. Even better if you can use this information in an automated system that can act on the data and you don't even need to look at it.

Denis chose a technology like this. His glasshouse automation keeps the temperature and humidity inside the glass house to the set points he chose, leaving him free to do other things. The only time he needs to act is if the systems texts/alerts him to say there is a problem like a power cut, or the system is unable to keep the humidity or temperature under control.

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Putting it into action

Technology that's going to be leapfrogged

As we see agricultural technology get smarter it will develop at a speed much faster than that of the mechanisation advancements we have been accustomed to. Think more like mobile phone-based advancements being released every six months. For those of us adopting this smart technology there is a big risk that what we adopt will be replaced by a much better version soon after. It may be wise to seek out technology contracts that renew often, and be hesitant of those with long return on investment.

It's nice that one day, technology can do X or Y, but what is it capable of doing today is more important. Are you fully utilising the technology you currently have, or are there small improvements that can lead to better efficiencies of existing technology on the farm?



Michael Ratcliffe



Technology adoption by small and medium sized agricultural businesses in the UK:
<https://qrco.de/bgVcX7>



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Putting it into action

In practice: Solar technology - Pecora Dairy, Australia

Thomas Clark NSch 2023

In a small parcel of land, in the tropical south highlands of Robertson, New South Wales, lies Pecora Dairy run by Michael and Cressida Cains. They are both incredibly knowledgeable individuals and together are a driving force in the agricultural industry. They run a flock of East Friesian sheep on a modest 75 hectares, of which two thirds is cleared, in grass with a light touch, low input approach. There is a clear respect for the biodiversity on farm and they strive to have minimal impact when carrying out operations in the day to day running of the farm.

They also process their milk into a range of cheeses, one of which is a raw cheese product requiring strict quality and safety protocols. Executing this on-site alongside the dairy gives them a reliance on stable power inputs. This is challenging when living near to the coast in such a unique climatic zone. A change in climate patterns has been noted with rain fall in 2022 more than doubling to over 4,000mm from a previous average of 2,000mm.

The frequency of storms in the area had started to pose a problem with several power outages. The repair to grid infrastructure took a number of days in some of the most severe storms experienced and older infrastructure was damaged in lighter storms. A solution had to be found to maintain a smooth operation in milking and processing.

A decision was made to install 28KW of solar Photo Voltaic (PV) on to the dairy roof and a 40KW flow battery. On average the combined system saves them approximately 80% on energy costs. This puts control of generation back into the hands of the farm and de-risks it from storm damage or inconsistent supply, providing them with energy security on stormy nights.

This system is also grid connected and using a smaller scale distributor, energy can be traded between sites. This is something that the Cains family do well: by selling excess energy to neighbouring farms and running their cheese and wine shop in the local village. This ultimately makes investment into electrically demanding systems more viable and becomes a profitable, as well being the preferred, low impact choice. Notably the most recent investment into an electric crate and handling system allows for more efficient use of labour and less stress on the sheep, enabling greater frequency in use, feeding into better management.



*Michael Cains (left)
and Thomas Clark*



Gate to grid, a responsible model for integrated energy production:
<https://qrco.de/bgVcZB>



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Putting it into action

TALKING POINT 6:

EID technology for livestock

Matthew Blyth NSch 2021



Despite electronic identification technology being available for over a decade, commercial sheep producers worldwide have been slow to adopt it.”

This is mainly due to limited information on its long-term effects on flock structure profitability and management decisions, which has resulted in producers focusing more on cost rather than performance.

While stud/pedigree producers have been able to see the benefits of EID through more accurate management of individual animals and data collection such as with Signet (pedigree breeding recording service in the UK), many commercial farmers remain unconvinced about the possible long-term gains. However, there is potential for commercial producers to use EID to make better practical decisions regarding flock or herd management.

In 2019, a study was conducted in Australia on maximising the value of existing technology in sheep production. The study explored the implementation of EID results across different scenarios to increase wool and meat production. The study found that despite incurring additional costs, there was a significant increase in revenue. For every dollar invested, a return on investment of between \$4 and \$6 was achieved, However, it is worth noting that when information gathered was not utilised, there was zero return on investment.

In 2018, a study was conducted by Scotland’s Rural College and Morden Research Institute on the impact of using a precision livestock systems-targeted approach in mountain sheep flocks. The study found that using precision livestock systems resulted in an average benefit of £3 per ewe, despite the additional cost of £21 per ewe for introducing a Prattley five-way Auto Drafter. This was due to the technology bringing in an average annual saving of £3 per ewe. As a result, the equipment would pay for itself after seven years on a 470-ewe flock. The savings estimated for a typical traditional farm were also significant, with a reduction in labour by 36% compared to using modern traditional farming techniques.



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Putting it into action



Monitoring the body condition score and maintaining consistent condition scores throughout the year can improve production. Identifying animals with early signs of internal parasites can potentially save money. The use of Targeted Strategic Treatment (TST) involves administering anthelmintics to only those animals that require it, as opposed to treating all animals. By selectively worming only those animals that need it, farmers can potentially reduce their anthelmintic use and lower their veterinary medicine costs.



Matthew Blyth



There is potential for commercial producers to use EID to make better practical decisions.”



Evaluating the potential cost benefits of electronic data recording for UK sheep and beef farms: <https://qrco.de/bgVccO>



TALKING POINT 7:

Data is the new oil

Dr Edward Thomas Jones NSch 2020



Data is often referred to as the ‘new oil’ of AgriTech because of its potential value in improving agricultural operations and increasing yields.”

The agriculture industry’s vast amount of data makes it a prime candidate for entrepreneurial innovation. Similar to oil, data possesses immense value and can be harnessed to fuel various applications and processes and it can be used to inform decisions about planting, irrigation, fertilization, and pest control, among other things.

By combining traditional (e.g. seen through the eye and recorded through pencil and paper) and cutting-edge approaches (e.g. measured through sensors and recorded on a blockchain), farmers amass and record a diverse set of data points.

Examples seen during this study of data being used in agritech includes gathering data on various factors in order to implement precision farming methods; data analysis used to spot issues before they escalate; and analysis of extensive data employ to forecast weather patterns and crop yields, Information from sensors enables farmers to utilise automation technologies to streamline activities, while data from monitoring livestock allows proactive health management.

The exponential rise in data produced by interconnected devices and the continuous progress in Artificial Intelligence (AI) are propelling the expansion of agritech, revolutionising the precision and automation of the agricultural ecosystem. To safeguard farmers and their businesses, data must be managed responsibly, with privacy and security in mind. It is crucial for farmers to understand the importance of their data and take appropriate measures to manage it. The value may not always be measured by the data’s monetary worth or potential sale price. Rather, it should symbolise the significance of data to the farmer’s economic well-being.



Data being captured



To safeguard farmers and their businesses, data must be managed responsibly, with privacy and security in mind.”



Are we making the right investments?: <https://qrco.de/bgVcES>



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Putting it into action

TALKING POINT 8:

Analysing pig sounds for health and welfare

Hugh Shedden NSch 2017

Soundtalks are a precision livestock farming (PLF) start-up company based in Leuven, Belgium headed by Dries Berckmans. His father, Daniel Berkman, is considered one of the leading pioneers of PLF. Soundtalks' take on monitoring for welfare is to record the sound of pigs by using microphones. Soundtalks "continuously and objectively monitors the health of a herd of fattening pigs by automated analysis of pig sounds".

Ensuring good respiratory health is vital in efficient pig production. Bad respiratory health can adversely affect growth, increase mortality and increase weight variance in a group, leading to poor pig marketing. On a badly affected unit, respiratory disease can cost up to £10/pig. Respiratory problems are multifactorial and complex diseases to diagnose and deal with. As farms are getting bigger we need tools to act as our eyes, ears and nose. By analysing sound, Soundtalks believes that they can detect potential problems 10 days before the farmer. Data the microphones collect is transferred into a format that can be easily analysed. Work is ongoing to differentiate respiratory sounds so that individual diseases can be identified.

The concept hasn't been without its problems. Cost has been a big stumbling block. The hardware is not cheap and for it to be more widely adopted it needs to be cheaper. One solution to this problem has been to develop a plug-and-play mobile device that can be moved around the farm. By targeting this mobile device at vets and health professionals Soundtalks have increased sales. The 24/7 real time monitoring of sound data enables the vets to be in the sheds even if they are hundreds of miles away. A vet only sees a snapshot of health in a shed; they can't be on farm all the time so this technology can be their ears.

A further interesting point from Dr Berkman was about the value of the data that is generated on farm. He didn't think it was going to revolutionise pig farming, but that data about the animal and the conditions it was reared in could have a value of €3-5 per pig. As consumers ask more questions about where their food comes, farmers will be able to give them a lot more answers thanks to 24/7 real time monitoring and recording.



Hugh Shedden



Utilising precision technology in the UK pig industry to enhance profitability and sustainability: <https://qrco.de/bgVcjV>



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Putting it into action

TALKING POINT 9:

Solar fences

Thomas Clark NSch 2023



Witnessing the Agvoltaics system at La Greenhouse in Italy, there were clear opportunities for UK applications.”

Solar can be run on gantry systems along fence lines allowing energy to be generated from marginal land already marked out with fences. In doing so these structures would pull cabling infrastructure to field boundaries facilitating access to power.

This may carry a higher cost as the panels are not so densely grouped and additional cable would be required. However, with increased infrastructure and connectivity, the ability to bring sensors and robotics into the field becomes more attractive, allowing key production decisions to be supported and profitability increased.

As service tracks will be required, this additional lane would be incorporated into additional biodiversity belts with establishing wild grasses or native flora to increase the credentials and integrated pest management (IPM) benefits of these areas.

Solar fencing is a low disturbance method of securing electrical generation from productive landscapes with added positive benefits to the biodiversity. As seen in France, the addition of green tramways has created additional areas for biodiversity, bringing positive impacts to the area and highlighting successful integration of biodiversity and infrastructure projects.



Solar gantry, Italy



Biodiversity-positive city tramway, France



Gate to grid, a responsible model for integrated energy production:
<https://qrco.de/bgVcmP>



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Putting it into action

In practice: Robotic milkers – Drumgoon Dairy, USA

Alisdair Cook NSch 2022

The first things that strike you about Rodney and Dorothy Elliot are their incredible business acumen and their infectious attitude to life. Having sold their farm and 140 cows in County Fermanagh Northern Ireland in 2006, they emigrated to South Dakota to start a new life.

At the time, the State was trying to encourage outside investment into agriculture and so, along with some risk capital investors, they started milking 1,400 cows on bare land with all inputs purchased in.

By 2019, the herd had expanded to around 5,000 cows being milked through two parlours. Although they had a stable management team and herdspeople, the Elliots found milking staff retention difficult. Therefore, for their next expansion, they decided to milk an additional 1,400 cows in an adjoining facility through 20 Delaval milking robots.

The cows in this barn could be looked after by two full time members of staff (excluding calving and feeding duties), which was estimated to be around a threefold reduction of what would be required in a conventional facility of this size.

Early figures from Drumgoon East are showing an increase in milk yield by around 10% and an increase in cow productive lifespan from 2.1 to 2.4 lactations.

At the time of my visit in September 2022, the Elliots were in discussion with neighbours to set up a new facility using 50 robots.



Alisdair Cook (left) and Rodney Elliot

“Early figures from Drumgoon East are showing an increase... in cow productive lifespan from 2.1 to 2.4 lactations.”



The utilisation and impact of robotics on large scale dairying:
<https://qrco.de/bgVcoc>



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Putting it into action

TALKING POINT 10:

Smart collars for cattle

Hattie McFadzean NSCh 2024



My study tour started with the Contemporary Scholar's Conference in Brazil, and took me to US, Mexico, Ireland, India, and around the UK."

Farmers in each location largely expressed concerns about the rate of climate change. These mainly included concerns of heat stress, drought, a warming climate, weather volatility, harsh rainfall and humidity events.

I heard countless anecdotal stories, such as from farmers who remembered wearing jumpers in winters some 15 years ago, and no longer having to do so (Tiwana Farms, Punjab State India), or tales of no longer having to defrost water pipes, despite the region historically being used as ski country in the winter (Clark Farm Dairy, New York State, US). The message was overwhelmingly clear for those in US, Mexico, and India especially, the climate has been changing at a fast enough pace for many to notice within the past 20 years.

Smart collars were being used as an adaptation technique in six of the farms, with at least one in every study location. Usually introduced because of declining health indicators for the herd, or issues with labour and staffing, the collars provided an opportunity to catch disease and health incidents early, invest into fertility, and to reduce vet call outs.

Most of these collars tracked respiration rate, feed intake, and rumination. One farm in Punjab State (conventional 200 cow herd, housed) in India estimated that collars saved them 15,000 rupees per cow (~£140) in vet bills and lost productivity. Before they used collars, peak milk yields ranged wildly between 15 to 40 litres for their Holstein Friesian herd. After collars and heat stress monitoring, peak yields were less variable, at 35-40 litres. Incredibly, mortality in the hot season reportedly dropped dramatically - from 15% down to just 2%.



Collars are used to monitor \ heat stress at Tiwana Dairy Farm, Punjab State, India.

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Putting it into action



Enhancing the resilience of UK dairy sector: How do we practically adapt to increasingly volatile weather conditions? <https://qrco.de/bgVcre>



In practice: Vertical farming - 80 Acres Farms, USA

Dr Edward Thomas Jones NSch 2020

The advent of technologies like AI, artificial lighting, and robotics has revolutionised the feasibility and efficiency of farming in controlled environments. In response to the growing global population and the urgency of ensuring food security, controlled environment farming emerges as an efficient and sustainable means to feed local communities.

80 Acres Farm's presence inside a warehouse gives it an appearance more akin to a NASA setup rather than a conventional or contemporary agricultural operation. The farm's multistorey buildings are equipped with cutting-edge climate control systems and bathed in the soft glow of LED lights, creating the ideal environment for plants, all guided by data analysis.

The workers at 80 Acres Farms possess a unique set of skills that differs from traditional farmers; they are more comfortable working with robots and computers that reflect the technologies and growing methods employed by the company.

The evolution of vertical farms has seen them progress from merely producing lettuce to effectively cultivating tomatoes, other vine crops, and soft fruits. Moreover, vertical farms, located within communities, offer a solution to the fragmented food supply chain by hiring individuals from the local community, thus reestablishing a direct link between people and their food supply.

The incorporation of sensors and cameras allows for the collection of data pertaining to room temperature, light, water, air flow, and other factors that have an impact on plant growth. Using advanced AI algorithms, the data is processed to identify the precise environmental conditions necessary for plants to flourish. These conditions are then replicated using cutting-edge technologies such as robots, artificial lighting, and other state-of-the-art tools. This innovative approach transforms vertical farming into a profitable business venture that ensures the delivery of superior quality and highly nutritious food to consumers precisely when and where it is needed.



80 Acres Farms



Are we making the right investments? <https://qrco.de/bgVct5>



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Putting it into action

TALKING POINT 11:

Low-cost automation

Jonathan Gill NSch 2018



Automation does not have to be costly. A lack of current solutions has led to the radical but highly cost-effective solution of 'Opensource revolution'.

The term Opensource software describes source code (computer programmes/apps) that are made freely available to be redistributed or modified. An example of this is 'AgOpen GPS', a fully functioning Autosteer system that simply requires a Windows computer or tablet to read the NMEA GPS data string from a GPS antenna. This can enable precision mapping control to be shown on screen as a simulated light bar. However, this system can become more powerful by connecting additional hardware such as a £15 microcontroller with a motor driver and a simple steering angle sensor. This simple, inexpensive, system can transform a vehicle to self-steer.

Not just limited to steering, AgOpen GPS can output sectional control switching for precision farming operations for sprayers and drills. I implore the reader to visit the developer's website <https://agopengps.jimdosite.com/>

The project has been well documented on YouTube with informative videos going back over two years [at the time of writing this Nuffield report], detailing the project from infancy to an impressive adaption of a John Deere tractor to become the 'Agrabot': a fully operational autonomous tractor albeit with limited capabilities.



This simple, inexpensive, system can transform a vehicle to self-steer.



How do we embrace automation in agriculture? <https://qrco.de/bgVcyJ>



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Putting it into action

TALKING POINT 12:

Robots for picking strawberries

Richard Copas NSch 2021

In the last five years several technology companies have been endeavouring to develop robots to pick strawberries. These companies have started with strawberries due to the longer growing season and high market volumes and values (30 times more by volume and 15 times more by market value than the cherry industry in the UK).

Like cherries, strawberries are a soft fleshed fruit which is generally harvested by hand with their stalk on. Historically a ground level plant, in the last decade in the UK strawberries have been grown on tabletop systems resulting in the fruit hanging below the plants. Due to this there are several similarities between the requirement to harvest strawberries and cherries.

Although still in their infancy robots are now capable of picking strawberries and several companies, for example Dogtooth and Tortuga, are looking to commercialise the technology. The challenges moving forward are increasing picking speeds, increasing the fruit clearance levels, and reducing the ratio of onsite engineers to robots.

Although robots can now technically pick strawberries the jury is still out on whether they will be commercially viable compared to hand picking. If the strawberry picking robots can be successfully commercialised, the technology should be easily transferable to the cherry industry. Already these companies are looking to transfer the technology to the table grape and tomato sectors.



Richard Copas



Dogtooth strawberry robot



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Putting it into action



The mechanisation of cherry production and harvest: <https://qrco.de/bgVcxK>



In practice: Automation and digitisation - Frederick Hiam, Suffolk

Jamie Lockhart NSch 2020

My Nuffield report documents the transformative journey undertaken at Frederick Hiam Ltd in Suffolk - a UK-based root vegetable producer - through a bold pursuit of automation and digitisation, within the niche yet vital domain of parsnip processing. Against the backdrop of escalating labour costs and declining availability, this innovation journey emerged from necessity but matured into a model of an industry first.

In 2021, as a company we faced a critical turning point. Manual labour shortages and soaring wage costs, exacerbated by Brexit and COVID-19-related constraints, threatened the sustainability of our processing operations. The nightly bussing of temporary workers from London for the parsnip line was both logistically impractical and financially burdensome. Something had to change.

Having been awarded a 2020 Nuffield Farming Scholarship, I used this opportunity not just to travel and study global trends but to drive real-time change within the business. It led to our decision to become an early adopter of emerging agricultural technology - culminating in a world-first fully automated parsnip trimming line, designed in collaboration with Wyma Solutions of New Zealand and the UK.

Beyond mechanisation, it led to digital integration of core business processes, notably the modernisation of the weighbridge system via a partnership with Select Software. A once-analogue asset was transformed into a real-time, connected information hub, showcasing the broader applications of 'Internet of Things' (IoT) technologies within agricultural contexts.

The outcomes of this journey have been profound. As a business we have not only reduced our dependence on manual labour but also doubled processing output, mitigating labour cost volatility, and, we feel, have positioned ourselves as a technological leader within UK horticulture. It has also laid a foundation for future innovation, such as the INSPeCT project aimed at improving post-harvest quality of parsnips and carrots. Through strategic risk-taking, collaborative innovation, and a refusal to accept traditional constraints, Frederick Hiam Ltd has turned a pressing operational problem into a story of agricultural reinvention.



Jamie Lockhart

“The outcomes of this journey have been profound.”



End to end automation of field scale vegetable production, incorporating data driven solutions: <https://qrco.de/bgVczA>



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Putting it into action

TALKING POINT 13:

Agritech's future

Dr Edward Thomas Jones NSch 2020

Agritech's future remains unpredictable, dependent on different factors such as technological innovation, economic patterns, and government policies. Nevertheless, the agritech growth is likely to continue, fuelled by rising food demand and the need to tackle food security and sustainability issues.

SOME OF THE TRENDS THAT MAY SHAPE THE FUTURE OF AGRITECH INCLUDE:

1. Greater adoption of precision agriculture: Precision agriculture technologies such as GPS-based equipment and sensors are likely to become more widely adopted, allowing for more precise and efficient management of farming practices.
2. Increased use of AI and machine learning: Artificial intelligence (AI) and machine learning technologies are likely to play an increasingly important role in Agritech, helping to optimise production and decision-making processes.
3. Growth of the plant-based protein market: The market for plant-based protein is expected to continue to grow, leading to increased investment in technologies related to plant-based protein production.
4. Increased focus on sustainability: Sustainability is likely to become an increasingly important focus in the agritech industry, as consumers and policymakers become more concerned about the environmental impacts of agriculture.

It is critical that home grown agritech capabilities are nurtured through business support, cluster development, knowledge transfer and inward investment and funding to enable proof of concept and scale up to commercial size.

“Sustainability is likely to become an increasingly important focus in the agritech industry.”



Are we making the right investments? <https://qrco.de/bgVct5>



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Putting it into action



Action that can be taken immediately (Do now)

Putting it into practice: The rules of technology adoption

Michael Ratcliffe NSch 2017

1. Cool does not mean useful, data does not mean valuable, technology should be used to make your life easier as a farmer. Look for technologies that are progressive, practical and profitable. Be aware, know what you want.
2. In order to benefit, you need to know what technologies are available: a way to cut through the overhype to know if a technology meets your needs and when to adopt it for maximum return.
3. If you are late to adopt technology in your industry then you won't be making money from your investment. Instead, you are likely playing catch-up to keep production costs in line with industry norm. The best technology is one that becomes industry norm; the best time to adopt it is before your competition.
4. Network, Network, Network. Networking is key to knowing what technologies will put you ahead in your industry. Understand if you are leading or playing catch up and offer opportunities for getting real-world feedback about a technology from other farmers.
5. Know what is important to you and your farm: does the technology deliver tangible benefits in these areas? Data for data's sake is not necessarily useful, it is only useful if you can act on this data. If it is useful data is it presented in a practical, easy to understand and use way?
6. Technology doesn't need to be amazing or novel to be useful. Are you fully utilising the existing technology on your farm? Smaller advancements in utilisation could lead to large gains.
7. Be aware of leapfrogging. Technological advancements are likely to develop rapidly. Be cautious of investing in novel technology with long term return on investment.



Look for technologies that are progressive, practical and profitable. Be aware, know what you want.”



Technology adoption by small and medium sized agricultural businesses in the UK: <https://qrco.de/bgVd2m>



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Putting it into action



Actions that require some planning (start planning)



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Putting it into action

Putting it into action: Recommendations for new technology

Edward Towers NSch 2021

For policymakers:

- Use incentives over enforcement: Encourage sustainable practices through incentives ('carrots') rather than punitive measures ('sticks'), empowering farmers to adopt environmentally friendly practices by offering rewards rather than imposing mandates.
- Recognise the environmental costs of imports: Importing food often shifts the responsibility for sustainable production to the exporting country. Consider policies that support local, sustainable farming and discourage reliance on imported goods with unclear environmental standards.

For farmers:

- Engage with emerging technologies and incentive systems: Explore the opportunities provided by technologies such as IoT, blockchain, and AI, as well as incentive programmes. These tools can enhance productivity, generate new revenue streams and strengthen your role in sustainable agriculture.
- Many people use the term 'wild west' among others as derogatory descriptions of the incentive markets. I feel this discourages farmers from engaging in the development of solutions. The market is similar to the wild west in that it holds significant potential for innovation and development but lacks established regulations, but without engagement from good and well-meaning farmers it won't develop into an established and positive mechanism. The demand and want for environmental services is present; we need the mechanisms to develop and create an opportunity to drive positive change.

For the public:

- Support regenerative agriculture: Show support for regenerative farming practices by choosing products that emphasise sustainability. Take an interest in where and how your food is produced, as consumer demand can drive positive changes within the industry. Choosing farm-owned brands with reputable and accountable owners.



For businesses:

- Focus on reducing environmental footprints: Commit to lowering your environmental impact by investing in sustainable practices within your operations. By setting an example, businesses can inspire others along the supply chain to prioritise sustainability.

For farming businesses:

- Adopt comprehensive sustainable practices: Embrace practices that balance productivity with environmental stewardship. Leverage technology to track and report on sustainability metrics, positioning your business as a leader in regenerative agriculture.
- Engage with developing incentives where possible.



These tools can enhance productivity, generate new revenue streams and strengthen your role in sustainable agriculture.”



The integration of new technology to incentivise environmental services:
<https://qrco.de/bgVc8G>





Long-term options to consider (Think ahead)

Think ahead: A ‘business-centric’ view

Dr Debbie McConnell NSch 2016

Currently, limited quantitative assessment of the impact of technology on farm performance is conducted. Prior to purchasing technology, farmers need to have a clear vision as to why they are investing and the intended outcome of that investment.

There is a role for research and industry to provide independent KPIs for technology that are linked to overall business profitability. Many of the benefits of precision technology are ‘soft benefits’ and can be difficult to quantify. Better systems need to be put in place to recognise these.

Prior to installation farmers need to identify key metrics that are of value to their business, to then monitor performance and determine the future impact and value of the technology for the farm business. Technology users need to understand how to influence the production systems that drive these performance measures in order to achieve successful technology integration into business decision-making.

Data platforms that allow physical indicator or financial benchmarking of farms against others are highly valuable and more should be developed. However, the use of technology cannot be allowed to shift the overarching direction of the business, and the farm, rather than being ‘technology-centric’, must retain a ‘business-centric’ view.



**Dr Debbie
McConnell**



“...Farmers need to have a clear vision as to why they are investing and the intended outcome of that investment.”



Digital Dairy: maximising the value of precision technology in the UK dairy industry: <https://qrco.de/bgVd6L>



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Putting it into action

Think ahead: Resources for further information

There are a range of organisations and establishments who can help with assessing the benefits (and drawbacks) of technology adoption for sustainability. This list (which is not exhaustive or in any particular order) may be able to provide help and support in terms of researching new technology, developing it and/or assessing its use and benefits:

ADOPT

ADOPT (Accelerating Development of Practices and Technologies) is a funding competition designed to support farmer-led, on-farm trials and experiments. Funded by the Defra and delivered by Innovate UK, it aims to generate, test, and demonstrate innovative solutions to challenges in agriculture, horticulture, and forestry. The full ADOPT Grant seeks to support projects with costs of between £50,000 to £100,000.

<https://www.farmpep.net/adopt/front>

Innovation for Agriculture

Helping farmers put innovation into practice, Innovation for Agriculture connects farmers with farming research. It works with leading agricultural researchers, businesses, landowners, and farmers to develop the knowledge and technologies that will make modern farming more sustainable, resilient, and productive. Through practical and interactive workshops, farm walks, and on-farm demonstrations, it helps farmers to put this knowledge into practice.

<https://www.i4agri.org/>

Innovative Farmers

Innovative Farmers is a not-for-profit membership network, for farmers and growers who are running on-farm trials to test innovative new practices. This farmer-led research allows them to collect robust data which is relevant to the real-world farming environment and easily transferable to their businesses.

<https://www.innovativefarmers.org/>

The British On-Farm Innovation Network (BOFIN)

BOFIN was founded in 2020 on the belief that farmers should be at the forefront of agricultural innovation – helping to shape research and development for the future of the industry. The BOFIN model is based around a ‘Knowledge Cluster’ which engages farmers and shares learning and insight from its projects. Joining BOFIN is free and includes membership of its Knowledge Clusters.

<https://bofin.org.uk/>



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Putting it into action

UK Agri-Tech Centre

An independent organisation, it aims to deliver solutions to agriculture's most complex challenges by accelerating innovation through expert insight, advanced facilities and strategic support. In collaboration with farmers, the agri-food industry and some of the best research institutions and most innovative companies in the world, it provides leadership and guidance to progress change.

<https://ukagritechcentre.com/>

Smart Agriculture IoT trials – North Wales

Farmers across north Wales are being given the chance to trial the latest innovations and technologies in agriculture, with the launch of a new network in summer 2026. The new Smart Agriculture IoT trials project, funded by the UK Shared Prosperity Fund, is delivered by Mentera on behalf of Ambition North Wales and is looking for 16 farms to join the initiative.

<https://mentera.cymru/smart-agriculture-trials/>

AHDB Cereal and Oilseed Monitor Farm Network

The Monitor Farm Network is a group of levy-paying farms that work together with AHDB and share ideas, improve farming practices and learn from each other. Each Monitor Farm is shaped by its region and guided by AHDB's knowledge exchange managers. This flexibility allows consideration of local priorities and real-life examples of innovation, business improvement and the value of the levy.

<https://ahdb.org.uk/monitor-farms>

Monitor Farm Scotland

Scotland's Monitor Farm initiative has pioneered new ways of working, experimented with new ideas and measured the inputs and outputs of host farms to improve their productivity and profitability. The current programme launched in November 2022 running to 2026 and features nine farms. The programme is managed by Quality Meat Scotland with support from AHDB and is fully funded by £2 million secured from the Scottish Government's Knowledge Transfer and Innovation Fund.

<https://www.monitorfarms.co.uk/>

AHDB Strategic Farms

AHDB's Strategic Farms, part of its Farm Excellence platform, deliver sector-specific improvements, with a focus on technical performance (as opposed to the whole-farm business performance focus of AHDB's Monitor Farms). The network of strategic farms across the UK encompasses arable, dairy, and beef and sheep, with meeting topics being based on demand from those who attend.

<https://ahdb.org.uk/farm-excellence-strategy>

Innovate UK Business Connect

Innovate UK Business Connect is part of UKRI (UK Research and Innovation), the UK's national funding body for science and research. It has a specific focus on agrifoods as well as robotics and many other sectors. It provides expertise, opportunities for funding and builds communities around emerging innovations. Its networks span business, government, funders and research.

<https://iuk-business-connect.org.uk/>

Scottish Government Knowledge Transfer and Innovation Fund

This provides funding for projects which aim to deliver innovative on-the-ground improvements in agricultural competitiveness, resource efficiency, environmental performance and sustainability. Funding support will meet the running costs of operational groups seeking to implement innovative projects in these areas.

<https://www.ruralpayments.org/topics/all-schemes/knowledge-transfer-and-innovation-fund/>

Farming Connect (Wales) – Try-out Fund

The Try-out fund has been developed to address specific local problems or opportunities in Wales with the aim of improving efficiencies and profitability within agricultural businesses while protecting the environment. It is only open for applications for a short window each year, with maximum funding of £5,000 to put towards an on-farm trial to try-out ideas and bring them to life.

<https://businesswales.gov.wales/farmingconnect/our-farms/try-out-fund-bringing-your-idea-life>

Innovation visits – CAFRE, Northern Ireland

This provides farmers with the opportunity to visit farm businesses in other parts of the UK or Europe to learn about new innovations being used in other countries but not yet in Northern Ireland. Each visit has a specific theme and visits are organised and led by a CAFRE adviser or technologist. The main costs of the IV are met through the Sustainable Agriculture Programme.

<https://www.cafre.ac.uk/business-support/knowledge-transfer-programmes/innovation-visits/>

Nuffield Farming Scholarships Trust - Scholarships

NFST aims to inspire passion in people and develop their potential to lead positive change in farming and food. It awards about 25 life-changing scholarships each year that unlock individual potential and broaden horizons through study and travel overseas, with a view to developing the farming and agricultural industries. More than 1,000 Nuffield Farming Scholars have completed their studies and travel.

<https://www.nuffieldscholar.org/>

Nuffield Farming Scholarship Trust - Next-Gen Scholars

The Next-Gen Scholarships are focussed on young people aged 18-24 as part of Nuffield Farming Scholarships Trust's initiative to develop young talent. They aim to help young people establish themselves in agriculture, using the Nuffield Farming network to link successful applicants directly to farmers.

<https://www.nuffieldscholar.org/scholarships/nuffield-farming-next-gen-scholarship>

Think ahead: Academic resources

Universities, research centres and other academic institutions can be a useful point of contact if you have a research project or piece of technology you might like help in assessing, whether it is a research project with an undergraduate or postgraduate student, or seeking more knowledge on new technology. Again, this list is not in any order and is not comprehensive:

Rothamsted Research

Rothamsted Research is a world-leading, non-profit research centre that focuses on strategic agricultural science to the benefit of farmers and society worldwide. Rothamsted Enterprises hosts a unique hub promoting collaboration and innovation by partnering with commercial agricultural technology businesses, It also works closely with farmers and other agri-tech innovation centres.

<https://www.rothamsted.ac.uk/>

Harper Adams

Home of the 'Hands-Free Hectare', Harper Adams says it is the University for food production and technology, animal health and wellbeing, and their contribution to sustainable, living environments for our planet's inhabitants. It has departments, curricula, and research specialisms in a wide variety of subjects, include technology, science, environment, engineering, entomology, plant science, animal wellbeing, veterinary science, sustainability, digital, data science and policy.

<https://www.harper-adams.ac.uk/research/905/at-harper-adams-university/>

SRUC

SRUC has a focus on education, research, and consultancy (through SAC Consulting). Working in partnership, it focuses on solving the ‘wicked challenges’ facing the planet, including climate change, biodiversity and access to nutritious food and clean water. Its Challenge Centres focus on critical areas to generate solutions and share research that delivers impact that brings about change.

<https://www.sruc.ac.uk/research/challenge-centres/>

University of Lincoln Institute for Agri-Food Technology

The university’s Lincoln Institute for Agri-Food Technology has a focus on improving productivity, efficiency, and sustainability through innovation, with its researchers engaged in international impactful research designed to make a difference across the food chain. With an interdisciplinary approach, its research brings together crop science, computer science, engineering, robotics, AI, and data management application.

<https://www.lincoln.ac.uk/liat/research/>

The National Robotarium

A global research institute at Heriot-Watt University, it works directly with industry to test and develop robotic, AI and automated technologies and rapidly move pioneering research from lab to market. It produces highly-skilled graduates who are trained to conduct world-leading research with a market focus, and delivers incubation and business acceleration support for start-up technology companies.

<https://thenationalrobotarium.com/>

Royal Agricultural University

The RAU’s approach to research is formulated around collaborations between scientists, farmers and innovators. Located in a largely rural area, it leverages collaborations, and develops innovative research projects, embracing farmer-science and farmer-led innovation networks. Its six research clusters include sustainability, regeneration and biodiversity in agriculture, livestock health and welfare and food policy, quality and security.

<https://www.rau.ac.uk/research/research-at-rau>

University of Reading School of Agriculture, Policy and Development

Reading has expertise spanning agriculture, animal science, international development, environmental management, food marketing and consumer behaviour. Its animal sciences work is focussed on increasing the sustainability of animal production, while its crop science research is tackling issues such as sustainable intensification of crop production, breeding for climate resilience, and horticultural growing technologies and systems.

<https://www.reading.ac.uk/apd/>



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Putting it into action

Newcastle University

Newcastle's agricultural research strengths are in production systems and food systems. Its work focuses on enhancing productivity and sustainability in livestock and arable agriculture, and addressing sustainable development issues in relation to food. Its researchers are looking at areas including precision agriculture, robotics, and new production systems such as vertical farms.

<https://www.ncl.ac.uk/nes/our-research/agriculture/>

Hartpury University

Hartpury's Agri-Tech Centre provides an independent support service for farmers and agri-businesses that are dependent on agriculture-based technologies. Through training, guidance and evidence-based practices, it says it will help users make confident decisions using data, digital information and different technologies.

<https://www.hartpury.ac.uk/for-business/hartpury-agri-tech-centre>

The James Hutton Institute

Using the latest advancements in robotics, drones, sensors, and gene editing, the Dundee- and Aberdeen-based JHI delivers precision solutions to the challenges facing modern farming. Its focus on big data and visualisation means it can decode large-scale biological data, unlocking new insights into sustainability, biodiversity, and global food security, and making data accessible, meaningful, and impactful.

<https://www.hutton.ac.uk/scientific-services/research-collaborations/>

SPONSORS



Central Region Farmers Trust

Central Region Farmers Trust's mission is to provide funding for education that benefits agriculture and horticulture in the central region. It strives to support farmers in adopting sustainable farming practices and enhancing their skills for a thriving agricultural sector.

www.centralregionfarmerstrust.org



Gloucestershire Agricultural House Foundation

Helping Agriculture in Gloucestershire by supporting the education, development and needs of people in the industry.



Elizabeth Creak Charitable Trust

The Elizabeth Creak Charitable Trust is a grant giving body that invests in people who will advance healthy, fair and sustainable UK food production. Grants finance projects that help farmers innovate to survive and thrive while scholarships support and encourage individuals to innovate sustainable practices in farming.

www.elizabethcreak.co.uk



Royal Agricultural Society of England (RASE)

The Royal Agricultural Society of England (RASE) is an independent charity and membership organisation dedicated to supporting the progression of knowledge and innovation within the agricultural community.

www.rase.org.uk

IN SUMMARY

This Bitesize Guide, from the Nuffield Farming Scholarships Trust and RASE, provides a snapshot of the breadth and depth of reports available at



<https://www.nuffieldscholar.org/reports>



The website also features reports from global Nuffield Farming Scholars, including Australia, New Zealand, USA and Brazil. The reports are a rich source of inspiration, case studies and thought-provoking recommendations for farming, food, horticulture, forestry and ancillary industries.

Please get in touch at info@rase.org.uk if you have questions, comments or feedback.



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