# Mobile Technology: Sowing the Seeds of Agricultural Transformation

Mobile UK

LIVE BETTER CONNECTED

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### About Mobile UK

Mobile UK is the trade association of the UK's mobile network operators (MNOs) - EE, Three, Virgin Media O2 and Vodafone. Mobile UK's mission is to realise the power of mobile to improve the lives of our customers and the prosperity of the UK.
www.mobileuk.org

### About Live Better Connected

The Live Better Connected awareness campaign by Mobile UK is designed to raise awareness and educate how we all, and wider society, rely on mobile connectivity for every aspect of life.
www.mobileuk.org/live-better-connected

### About Building Mobile Britain

Mobile UK launched Building Mobile Britain in 2018 to support the mobile industry's collaboration with national and local government, regulators, industry, consumers and citizens to overcome the challenges to expanding mobile networks.
www.mobileuk.org/building-mobile-britain

### About 5G Check The Facts

The #5GCheckTheFacts campaign provides factually accurate information about 5G and offers answers to common queries to help improve understanding.
www.mobileuk.org/5g-and-health

### About this report

The report was produced by Mobile UK with assistance from Purplefish and Block B design. Purplefish is an award winning UK PR and communications agency: www.purplefish.agency

# 1. Cultivating a New Era In Agriculture: The Mobile-Driven Transformation

Agriculture, a vital and ancient industry, is more associated with tradition than high technology. But unlike the predictability of the changing of the seasons, mobile technology is heralding a significant transformation in the sector. In fact, much like how the agricultural revolution of the past fundamentally reshaped farming methodologies, the incorporation of digital technologies, facilitated by mobile networks, promises similarly revolutionary changes.

At the heart of this evolution lies the ability for farmers to gain unprecedented visibility into their operations. Mobile connectivity facilitates the use of interconnected sensors and intuitive applications, enabling real-time monitoring of crucial factors like soil conditions, crop vitality, and irrigation needs. This data-driven approach empowers targeted interventions, minimising the overuse of resources such as water, fertilisers, and pesticides, leading to both ecological benefits and enhanced crop production. Simultaneously, mobile networks are breaking down geographical barriers, fostering a global exchange of agricultural knowledge and optimal practices.

*'Having reliable mobile and broadband connectivity is essential to enable these businesses and the rural economy to thrive.'* [1]

**NFU Norfolk Chairman**

1 www.edp24.co.uk/news/24458031.norfolk-farmers-want-action-improve-mobile-connectivity/

**97%**

of respondents believe mobile signal is important for their business [2]

This digital integration is also driving the evolution of farming equipment and practices. Autonomous machinery, including self-driving tractors and robotic harvesters reliant on mobile networks, are becoming increasingly practical for boosting efficiency and addressing workforce challenges. Furthermore, aerial monitoring via drones equipped with cameras and sensors provides valuable field-level intelligence, allowing for proactive crop health management, early detection of threats like pests or diseases, and optimised resource allocation. And finally, for livestock, connected devices offer enhanced tracking of well-being and location, enabling timely responses to ensure animal health and safety.

This report examines the diverse ways in which mobile connectivity is reshaping agriculture and how the integration of mobile connected tools has the potential to usher in a new period of productivity and resilience, mirroring the profound impact of the agricultural revolution.

*"5G-enabled technology can reduce farming costs by 15% and increase crop yield by 13%. Drones equipped with 5G can capture images across large farmland areas, helping farmers analyse soil quality and manage livestock more efficiently." [3]*

**American Farm Bureau**

2 https://www.nfuonline.com/updates-and-information/nfu-digital-access-survey/
3 https://www.iotworldtoday.com/smart-cities/connected-farming-harvests-data-and-gives-agriculture-a-jolt



# 2. Addressing Agricultural Challenges Through Enhanced Connectivity

The agricultural sector faces a complex array of challenges, from optimising resource use and managing environmental pressures to enhancing operational efficiency and ensuring safety. Mobile connectivity offers a powerful toolkit to address many of these difficulties.

Here we investigate specific areas where mobile technology is proving instrumental in transforming agricultural practices, outlining the challenges and demonstrating how connected solutions are fostering positive change across precision agriculture, resource management, operational efficiency, access to information, and on-farm safety and security.

## Precision agriculture and resource management

**Real-time data collection and monitoring:** Mobile connectivity enables the deployment of Internet of Things (IoT) sensors across fields to monitor crucial parameters like soil moisture, temperature, humidity, nutrient levels, and crop health in real-time. This data can be transmitted wirelessly to farmers' devices or cloud platforms for analysis. For example, soil moisture sensors can send alerts to a farmer's smartphone, indicating the need for irrigation, thus optimising water usage and preventing waste.

**Precision irrigation and fertilisation:** By integrating sensor data with GPS technology and connected machinery, farmers can implement variable rate application of water and fertilisers. Mobile connectivity facilitates the transmission of precise application maps to smart irrigation systems and variable rate fertiliser spreaders, ensuring that resources are applied only where and when needed. This leads to significant cost savings and reduces environmental impact by minimising runoff.

**Pest and disease management:** Connected sensors and drones equipped with cameras can help in early detection of pests and diseases. Images and sensor data can be analysed remotely, and farmers can receive timely alerts on their mobile devices, allowing for targeted interventions and reduction of the overall use of pesticides. For instance, drone imagery analysed for plant health can identify areas with early signs of disease, enabling localised treatment before it spreads.

**Livestock monitoring:** Wearable sensors connected via mobile networks can track the location, health (e.g., temperature, heart rate), and behaviour of livestock. Farmers can receive alerts on their smartphones about sick or distressed animals, allowing for prompt veterinary care. GPS tracking can also help in managing grazing patterns and preventing livestock theft. For example, a farmer might receive an alert if a cow's temperature spikes, indicating a potential infection.

## Operational efficiency and cost reduction

**Remote equipment monitoring and maintenance:** Mobile connectivity allows farmers to monitor the performance and location of their machinery in real-time. Sensors on tractors and other equipment can transmit data on fuel consumption, operating hours, and potential maintenance issues. This enables proactive maintenance, reduces downtime, and optimises equipment usage. For instance, a farmer can receive an alert on their tablet about an engine overheating in a tractor, allowing them to address the issue before it leads to a breakdown.

**Automated operations:** Autonomous tractors and other agricultural robots rely on robust connectivity for navigation, control, and data transmission. Mobile networks, especially with the advent of 5G, can provide the low latency and high bandwidth required for real-time control of these machines, improving efficiency and reducing labour costs.

**Supply chain management:** Mobile connectivity can enhance traceability and transparency in the agricultural supply chain. Sensors can monitor storage conditions (temperature, humidity) of harvested crops, and this information can be shared with logistics providers and buyers in real-time, ensuring quality and reducing post-harvest losses.

## Access to information and markets

**Weather updates and forecasting:** Farmers can receive up-to-date weather information and localised forecasts on their mobile devices, enabling them to make informed decisions about planting, harvesting, and other field operations, minimising risks associated with adverse weather conditions.

**Market information and price discovery:** Mobile apps can provide farmers with real-time market prices for their produce, connecting them directly with potential buyers and reducing reliance on intermediaries. This can lead to better price realisation and increased income.

**Knowledge sharing and extension services:** Mobile connectivity facilitates access to online agricultural resources, expert advice, and virtual training programmes. Farmers can connect with extension officers and peers through online platforms, enabling the exchange of best practices and timely solutions to farming challenges.

## Safety and security

**Worker safety:** In remote farming locations, mobile connectivity can be crucial for ensuring the safety of agricultural workers. In case of accidents or emergencies, they can use mobile devices to call for help. Connected wearable devices can also monitor vital signs and send alerts if a worker is in distress.

**Farm security:** Wireless security cameras and sensors connected via mobile networks can help monitor farm premises, livestock, and equipment, deterring theft and providing real-time alerts in case of unauthorised access.

**80%**

farm holdings using precision farming methods aim to increase productivity. 40% are improving impact on the environment [4]

Heat stress in cows costs the UK economy

**94.6m**

annually [5]

4 https://www.statista.com/topics/6703/precision-farming-and-agricultural-digitalization-in-england

5 https://uktin.net/how-to-deploy-5G/agriculture/livestock-management

# 3. Connectivity in Action:
# Real-World Impact of Mobile Innovation in Agriculture

## Farmonaut:
### Impact of mobile-enabled soil moisture monitoring on a Scottish potato farm

A significant benefit of integrating mobile technology in agriculture is the ability to optimise resource management, as illustrated by a large-scale potato grower in Scotland. By implementing a system of soil moisture sensors connected via the mobile network, the farm transitioned from traditional irrigation scheduling to a data-driven approach. Real-time soil moisture data allowed for precise irrigation, applying water only when and where needed. This resulted in substantial water savings exceeding 30% within a single growing season.

The reduction in water usage directly translated into considerable energy cost savings, as less pumping was required. The combined decrease in water and energy expenses for the season was estimated at £30,000, clearly highlighting the economic advantages of adopting mobile-enabled precision agriculture. [6]

6 https://farmonaut.com/united-kingdom/precision-agriculture-transform-scottish-farming-with-farmonaut

## Growing Sussex:
### Cultivating the connected field

A £3.8 million initiative in West Sussex, "Growing Sussex 5G Innovation," is exploring how 5G connectivity can transform food and wine production in the region. The project aims to integrate 5G and advanced technologies across various agricultural settings, including glasshouses, vineyards, nurseries, and aquaculture, to foster smarter and more sustainable practices.

Growing Sussex brings together commercial growers, educational institutions, and technology partners to address key challenges in the agricultural sector. The initiative has several core objectives: to stimulate demand for scalable 5G infrastructure supporting UK agriculture, to enable data-driven decision-making for improved food and drink production, to develop a digitally skilled agricultural workforce, and to foster a 5G ecosystem through innovation. [7]

## 5G Rural Dorset:
### Using data effectively

Soil quality is one area where collecting data and monitoring quality is vital to crop yields and being able to plan ahead. Collecting data - previously manually is time-consuming and expensive, costing farmers thousands.

5G has the potential to change that - as part of the 5G Rural Dorset project, Wessex Internet has deployed a range of over 40 5G-enabled sensors across three farms in the county.

The trial research project aims to reduce the cost of monitoring sensors for farmers. 5G Rural Dorset is also looking at enabling 5G to collect data beneath the waves to help growers and farmers maximise yields of crops like seaweed and fish stocks.

Jurassic Sea Farms in Portland Port is collaborating with RS Aqua and Wessex Internet to connect rugged sensors to 5G to prove that the technology is suitable for collecting information such as oxygen levels and light levels in the water.

innovation and data-sharing ecosystem. This collaborative effort seeks to demonstrate the practical benefits of enhanced connectivity in improving efficiency and sustainability within the West Sussex agricultural community.[8]

7 https://growingsussex.org.uk/about-the-project/
8 https://5gruraldorset.org/projects/future-of-food/use-cases/

## 5G RuralFirst:
Connected cows in Somerset

As part of the UK's 5G RuralFirst project, new wireless and networking technologies were tested across Orkney, Shropshire, and Somerset to assess the potential for 5G to improve rural connectivity and support next-generation farming. A key agricultural use case was livestock management, trialled in Somerset, where 5G-enabled sensors were deployed to monitor cattle health and behaviour in real time.

Through an app named *Me+Moo*, participants were able to choose their own connected cow from a 5G RuralFirst farm and learn about how 5G technology is being used in everyday life with animals. Through this app users received regular updates on everything from how the cows are eating to how they are sleeping using the data collected by 5G technology. To monitor this, the cows were fitted with wearable devices that tracked key indicators such as eating habits, rumination patterns, and fertility signals. These data points, transmitted over 5G, enabled farmers to detect early signs of illness or stress, improving animal welfare and allowing for prompt intervention. Farmers reported time savings of 10–14 hours per week through reduced manual observation and earlier diagnosis of health issues.

The project also explored remote veterinary support via augmented reality (AR), enabling real time, hands-free consultations with vets, enabling farmers to ask advice and see how to care for animals in real time, using voice commands. This not only saved travel time for veterinary professionals but also reduced delays in treatment, particularly important in isolated areas where livestock vets are in short supply.[9]

9 https://www.gov.uk/government/case-studies/5g-ruralfirst-rural-coverage-and-dynamic-spectrum-access-testbed-and-trial



# 4. Ensuring the UK's Agriculture Sector Capitalises on Mobile Connectivity

The commercial, economic, and environmental advantages of agricultural innovations beginning to utilise 5G and IoT connectivity are becoming apparent within UK agriculture and farming, driven by industry investment. However, to move beyond this tentative stage and fully leverage these technologies for enhanced productivity and efficiency, the UK Government must prioritise mobile infrastructure investment within its policy thinking, actively incentivising its growth and accelerating its rollout to meet the sector's evolving needs.

**Mobile UK has put forward eight key policy proposals to help that happen:**

1. Repurpose the £320m annual license tax from the industry via spectrum licence fees
2. Reform planning to enable the more rapid deployment
3. Prioritise full implementation of the PSTI Act
4. Introduce a temporary business rates holiday on new mobile infrastructure deployments
5. Evolve the UK's net neutrality regime towards a more flexible, principles-based approach
6. Support industry's plans to retire legacy 2G networks
7. Enhance the rollout of 5G at regional and local levels by appointing skilled and experienced digital champions
8. Ensure public funding already committed through the Shared Rural Network is retained and invested into mobile infrastructure deployment

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