

# Farm Tech Circle

# NEWSLETTER

Issue 1: 2022

Welcome to Agri-EPI's Farm Tech Circle, a new platform for farmers, growers and producers to discover and connect on topics that focus on enhancing the profitability and sustainability of agriculture. We are thrilled that you have joined as a founding member of the community!

Benefits of joining the Farm Tech Circle will include access to quarterly newsletters featuring pieces on technical advances in the agri-tech sector, project case studies and industry updates, along with priority registration to our on-farm events, and access to drop-in sessions with our technical team. There will also be the opportunity to give direct feedback to tech developers and ourselves, helping us to develop technologies which work for yourselves.

Stay tuned for more to come!

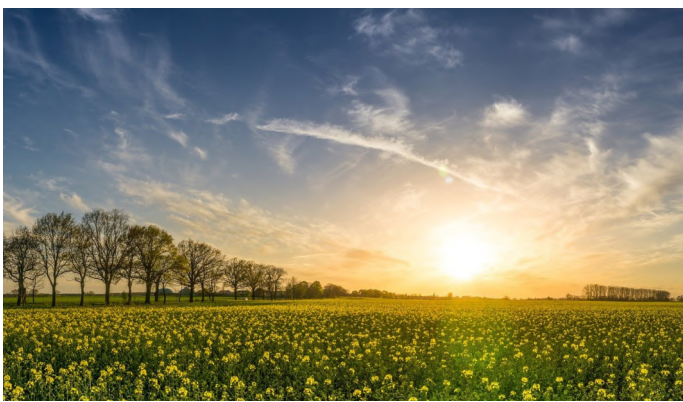


## FARM TECH CIRCLE

powered by the  **AGRI-EPI CENTRE**  
Engineering • Precision • Innovation

## On-Farm day at Kaiapoi Farm

Last month we hosted our second on farm demo day of the year at Kaiapoi Farm in Hertfordshire. Joined by a broad mix of farmers, technologists, academics and industry representatives, farmers Rob & Jo Hodgkins led fascinating discussions about their business and their transition to a regenerative farming system that supports the profitability of the farm-business. The farm tour also included talks around inter-row hoeing, novel sheep breeding techniques, and a discussion with Marcus Travers from Soil Essentials about soil carbon and nitrogen retention.



## Funding Opportunities

### Farming Innovation Programme - research starter pilot - Eol Round 2

Defra is working with UKRI to invest up to £1million in innovation projects. The funding for this competition is part of Defra's **Farming Innovation Programme** which is delivered in partnership with UKRI's **Transforming Food Production Challenge**.

The aim of this competition is to:

- investigate early-stage solutions with the potential to substantially improve overall productivity, sustainability, resilience and move existing agricultural sectors to net zero
- prioritise solutions that have positive outputs for farmers, growers or foresters in commercially relevant situations
- accelerate development of effective new agricultural solutions by working with end-users and collaborating with the wider UK research community in the innovation process

Applicants must be farmers, growers or foresters in England and must be able to demonstrate how the project will benefit these sectors. [Apply online here.](#)

## Agri-EPI's Farm Network

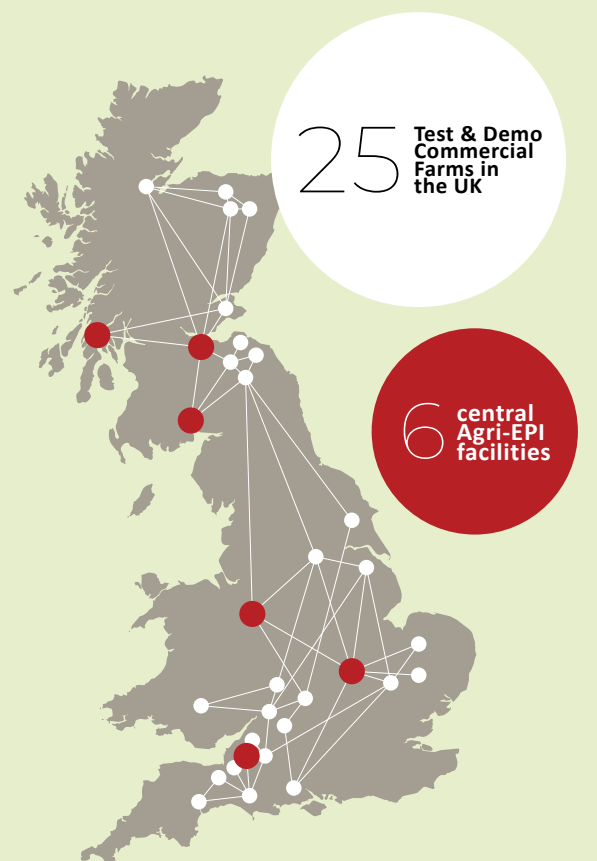
As a key, government-backed player in the agricultural sector, we at Agri-EPI Centre have been able to enlist 25 farms spread throughout the UK to participate in the Agri-EPI Farm Network.

We equipped these farms with a suite of precision sensor technologies to measure variances across every dimension of food production – quality, productivity, wastage, and more.

The basic package includes computers, IT infrastructure, meeting rooms with displays, a DJI drone, and a Davis weather station designed to get 'offline' farms digitally connected. We also offer satellite imagery, soil-zoning, soil-sampling, and other bespoke technologies based on the needs of the farm and collaborators.

From there, we can begin to implement the technologies and innovations that will change the future of farming, and assess the ways in which we can work together to bring these ideas to full commercial viability.

Read more [here](#).





## The rising cost of agricultural inputs

Rising costs of farm production such as fertiliser, seed, agrochemicals, energy, labour, and machinery are challenging the agricultural sector more than ever before. This has been slightly offset by increased values of outputs; however, it is vital to evaluate budgets to anticipate expected profits or losses for this season and for 2022/23.

As “Price Takers” farmers have limited control over revenues and receive the value of the commodities they market at the point of sale under current conditions unless they are in forward contracts. Cuts in farm payments will continue to have an impact on revenues.



### The rising cost of inputs can be attributed to several factors:

- **Covid 19** has seen a global government spending policy to boost productivity to “re-start” the economy which has seen sharp rises in inflation and an increase in input costs.
- **Increased demand for energy** for manufacturing has contributed to increased fuel prices and higher prices for high energy commodities such as fertiliser and agrochemicals.
- **Russia’s military campaign in Ukraine** will have a marked impact on global grain supplies, and there is increased pressure on other commodity producing nations to deliver the anticipated shortfalls, leading to increased area being planted and a greater demand for inputs already in short supply.
- Covid 19 has also **disrupted the labour markets** in agriculture and many other sectors pushing up wages. It has also led to an interruption in supply chains leading to production lagging behind demand. This “just in time” method of delivery which was intended to keep overheads low has been severely disrupted meaning products are not guaranteed to be available when required which inevitably leads to price increases.

All these challenges therefore make it vitally important to consider ways of controlling some of these input costs and this is where Agri-Tech innovation will play its part. Data will play a key role in providing information for more informed decision making:

- Satellite information and connectivity with IOT sensors, drones and robots to gather imagery and perform basic manual tasks like weeding and eventually harvesting.
- Agricultural machinery able to do variable rate application of fertiliser, seeds, and targeted agrochemicals.
- Better use of farm manures and slurry with less reliance on inorganic fertilisers.
- Improved grazing management to increased output from grass.
- Sensors on animals to monitor health parameters such as temperature, oestrus, lameness.
- Environmental control of housing to improve livestock welfare and productivity.

Agri-EPI Centre, as one of the four innovation centres in the UK is working with tech developers, academics, and end users to further develop solutions to real on farm problems which will assist the sector in achieving it's goal of carbon neutrality and enable environmental, economic and social sustainability.

## CASE STUDY

### Farming Innovation Pathways: LightWeeding



The LightWeeder is a world-first eye-safe, herbicide-free, carbon neutral, commercially viable weeding system delivered by lightweight autonomous field robots via UK agri-robotics company and Agri-EPI Centre member, Earth Rover.

The LightWeeding technology uses semiconductor LEDs to solve key technical, safety and commercialisation challenges faced by laser-based weeding systems.

With increasing types of chemical-resistant weeds, a significant downturn in availability of hand labour plus a shift in society towards more organic options, now more than ever there is a need to change the way we farm. A recent report by Rothamsted Research shows weeds “pose an unprecedented threat to our food security” and highlights the need to diversify weed control as an urgent priority.

As explained by John Taylor, Farm Director at Pollybell Organic Farm, “the key element here is that the LightWeeder not only makes chemical free farming more effective but it also solves the huge issue farmers are facing today in terms of the huge loss in labour force. Being able to weed fields autonomously means that food production doesn't just grind to a halt.”



# Drone use in UK agriculture

Agricultural drones, also known as unmanned aerial vehicles (UAVs), are set to disrupt the agriculture industry owing to their immense potential to make agriculture more efficient, precise, and productive, driving the economic case for drone use. With farmers grappling with mounting pressure to boost production while adapting to climate change and dealing with increasing costs of production and changing support frameworks, drones present a compelling solution to improve the efficiency of the entire farming enterprise.

Growers and their advisors can exploit the technology for data collection to identify stressed areas of crops, study and map farmland, and improve irrigation efficiency. In addition to spraying water, fertilisers or pesticides on crops, drones can be used for livestock monitoring and tracking animal population and health.

Increased efficiency will drive the economic case for drone use. Drones can cover large areas of land, quickly and efficiently, provide quick and low-cost farm-related data to assist in effective decision making, and improve yield estimations, helping growers efficiently plan for storage, labour, farm resources, and transportation requirements with more certainty about the quality and quantity of the fruit crop being produced. Drones provide a higher level of accuracy, potentially reducing the frequency and quantity of agrochemicals used.

Labour shortages are a big challenge with the changing roles on farm, and through automation, drones allow labour to be redeployed to other farm operations. Making these jobs safer by reducing

exposure to chemicals using drones to spray crops means that fewer staff will be exposed to chemicals compared to manual spraying.

The environmental impact of food production is under scrutiny and drones can help farmers reduce food waste by improving crop quality, reducing inputs and lowering CO2 emissions. The addition of drones in fields should also reduce the travel of heavy equipment going through the field on such a regular basis.

Precision agriculture practices, which can help farmers make better-informed decisions, have evolved significantly over recent years, with the global market now estimated to reach \$43.4 billion by 2025. While drones have not yet made it into the mainstream agriculture space, they are playing an increasingly important role in precision farming, helping agriculture professionals lead the way with sustainable farming practices, while also protecting and increasing profitability.



The demand for agriculture drone services is consistently growing around the world, particularly Asia, South America, and Australia. Drone service providers are offering advanced solutions with improved quality and in-depth analysis, spurring service adoption. The demand for agriculture drones for mapping and spraying is substantially growing among the services, in areas of extensive production, remote locations, and low populations where access is difficult.

The landscape in the UK certainly differs to that of extensive cropping systems with many UK farmers working close to highly populated areas and with that comes a different set of risk factors to overcome.

Working closely with farmers across the Agri-EPI network and setting up a suite of drone capabilities we understand the true industry needs and the current limiting factors. Farmers want more robust and detailed crop data that will inform their decision making, however regulatory limiting factors for flying drones on farms, skills required to operate drones, and time involved are all concerns that need to be overcome to see this technology gain widespread adoption.

Working at Agri-EPI gives me the opportunity to work with farmers, regulators, and technology developers to overcome these challenges helping create innovative solutions for on-farm drone deployment.

Within the Agri-EPI network we are working with the top fruit industry, to use cutting-edge drone and machine learning technologies to provide growers with detailed crop insights, using drones with multi-spectral, hyper-spectral or lidar sensors with the aim to increase productive yield from an orchard by 10%.

To overcome the need for training on farm we are working with companies who can deliver 'drone in a box' systems where the drone arrives on farm ready to use, designed specifically for the farm needs. Drone in a box service that will allow a grower to remotely trigger a pre-planned drone flight will increase adoption rates.

There are also advantages to the use of BVLOS (Beyond VLOS) flights where one drone and operator can cover much larger areas in a shorter time, something which can be done cost-effectively by a service provider. Current Visual Line of Site VLOS operations are only within 500m. BVLOS (Beyond VLOS) allow the operator to be in an entirely different place to the drone and allow them to cover the last areas without having people on the ground to monitor.

There is ongoing work with HSE and the wider industry to start to answer some of the questions in Spray drone technology in order to implement greater safety measures and improved accuracy. This will allow areas that need low volumes of spray to be targeted and will allow for advantages when traveling across the ground is difficult or remote.

**Drone technology is not a solo technology to overcome all on-farm challenges, but part of an integrated solution complimenting satellite and robotic technology and existing farm practice – allowing farmers to pick applications that work for their business.**





## What's happening on farm?

Summer is around the corner and the team at Agri-EPI are busier than ever. We have been working very closely with the farmers across the Satellite Farm Network, deploying technical kit on farm, managing on-farm project activity, organising farmer-led grant funding applications and hosting on-farm events.



On our mixed livestock and arable farms, activity has slowed slightly after an incredibly busy spring. Lambing has finished on our many sheep farms, including the newest addition to the Satellite Farm Network: Newton Farm in Brecon, Wales, as well as Conon Brae in Dingwall, Scotland and Kaiapoi Farm in Hertfordshire, England. New staff members Charlie Bowyer and Ross Robertson have been working to bring new technology and project activity to our sheep farms.

Drilling and planting have been complete for some time now, and crops are growing quite happily across the country. At Cold Harbour Farm in Beverley, England, Agri-EPI has provided Paul Hayward a Nitrogen Sensor that mounts to his tractor and measures biomass as he drives through the field. He will use the information it gives him to inform his Nitrogen fertiliser application for his Birds Eye green

peas. At Elveden Estate in Thetford, England, and Abbey Farm in Doncaster, England, farm manager Andrew Francis and farmer David Armstrong are measuring the soil moisture in their potato fields using sensors partially provided by Agri-EPI and developed by Soil Moisture Sense. These sensors will help them to make educated decisions about irrigation, which is especially crucial during such warm weather. Many of our arable farmers have also received licences to DroneAg's Skippy Scout, a drone software that programs flight maps and identifies diseases and pests in cereals. This trial will help farmers save time by replacing crop-walking and will help DroneAg to further develop the platform and include more types of crops.

Agri-EPI is investing in our beef farmers as well as maintaining a long and successful relationship with Ritchie's by deploying six more beef monitors across



the Satellite Farm Network. The Hoskins at Maiden Castle Farm, Richard Gantlett at Yatesbury House Farm, and the Rodericks at Newton Farm will all be installing Ritchie's Beef Monitor Units in their sheds this year, which will enable them to precisely track their finishing herds live weight gain and maximise their profitability. Agri-EPI Centre's beef monitors are also being used in the Opti-Beef project, which aims to develop an enhanced decision support system for farmers by integrating the beef monitors live weight gain monitoring with detailed carcass measurements from the abattoir.

Changes at the Southwest Dairy Development Centre are under way to further enhance cow welfare. The dairy is changing to a free access system from the current guided set up and the robots are being moved to the end of the building to improve cow flow to grazing. Whilst the renovation of the Southwest Dairy Development Centre continues, Agri-EPI is still supporting our dairy Satellite Farmers through a number of different technologies and projects. One notable project, Healthy Heifer, which has been trialling ear tags that can detect illness in dairy young stock, is now in its final stages. The project has been taking place on Parkend Farm in Dunfermline, Scotland, Godminster Farm in Somerset, and Mackie's of Scotland in Aberdeenshire, and we are looking forward to collating and disseminating project outcomes as soon as possible.

We are working hard to progress these activities and are looking ahead to even more potential projects on-farm. The team at Agri-EPI Centre is sending all UK farmers well wishes for a successful harvest!

## CASE STUDY

### WELL-CALF

Our team recently visited one of our test and trial facilities at Chain Farm in Cambridgeshire to see our WELL-CALF project in partnership with **Parklands Veterinary Group**, **Smartbell**, and **SRUC**, in action.

Funded by Innovate UK, the WELL-CALF project aims to develop the first cloud-based decision support platform to serve different levels of decision-making on dairy and beef farms. WELL-CALF's precision agriculture technology provides support for farm-level decisions (e.g. health management, nutrition) all the way through to policy and practice decisions at the systems level.



The WELL-CALF project works to develop the first precision agriculture integrated monitoring system that was specifically designed for early disease detection or developing health issues in calves from seven days old to sixteen weeks old- specifically focusing on pneumonia and scours. The project makes optimising treatment and management practices at an individual animal level a simple and accessible reality for dairy and beef farmers.

## Agri-EPI at the shows





# Upcoming events



**22-23  
JUN**

**Groundswell  
2022**

*“By Farmers, For Farmers”*

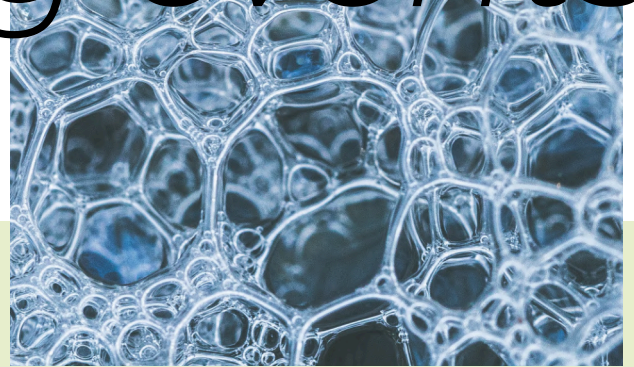
Agri-EPI is excited to be exhibiting again at this years Groundswell event – The Regenerative Agriculture Show and Conference.

Entering its sixth year, The Groundswell event provides a forum for farmers and anyone interested in food production or the environment to learn about the theory and practical applications of Conservation Agriculture or regenerative systems, including no-till, cover crops and re-introducing livestock into the arable rotation, with a view to improving soil health.

Groundswell is a practical show aimed at anyone who wants to understand the farmer’s core asset, the soil, and make better informed decisions. It is a two-day event featuring talks, forums and discussions from leading international soil health experts, experienced arable and livestock farmers, agricultural policy experts, direct-drill demonstrations and AgTech innovators.

With wide appeal across the food and farming spectrum, Groundswell is relevant for conventional, organic, livestock, arable, landowners or tenant farmers.

**Register here**



**20  
JUL**

**Making farming more sustainable: Ultra Fine Bubble Technology**

Ultra-fine bubbles, also called UFBs or nanobubbles, are very small, very stable long-lasting bubbles. With the ability to carry gases and different substances on their surface, their stability and longevity means that they have great potential for use in agriculture.

Revolutionizing irrigation, fertilizing, spraying and disease prevention, amongst a wealth of other applications, it’s projected that ultra-fine bubbles can radically improve food security and environmentally friendly farming techniques.

Exciting possibilities for more profitable, sustainable and productive farming are being offered by the emerging technology ‘ultra-fine bubbles’ (UFBs). The technology is being explored in a £250,000 **Innovate UK**-funded project, led by MagGrow UK in association with Agri-EPI Centre and the Centre for Crop Health and Protection (CHAP).

Join us for our online webinar on 14th June from 10AM-12PM in collaboration with project partners from MagGrow and CHAP to discuss this amazing technology.

**Register here**

All events can be found at  
<https://agri-epicentre.com/events/>