FARM TECH CIRCLE

Newsletter

Issue 4: 2023 | Keeping you up to date with the latest agri-tech developments

FARM TECH CIRCLE

powered by the AGRI EPI CENTRE

Sustainable weeding technology: CLAWS

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.

Earth Rover has developed the CLAWS rover (an acronym for Concentrated Light Autonomous Weeding and Scouting), with funding from Innovate UK as part of the Farming Innovation Pathways industrial research, and in collaboration with project partners Pollybell Farms and Agri-EPI Centre. The rover uses AI and robotics to accelerate crop growth by removing weeds, including herbicide-resistant weeds, without disrupting the soil, generating a more sustainable and effective alternative to other weeding techniques in the agriculture industry.

Watch the video

Read the case study

CASE STUDY

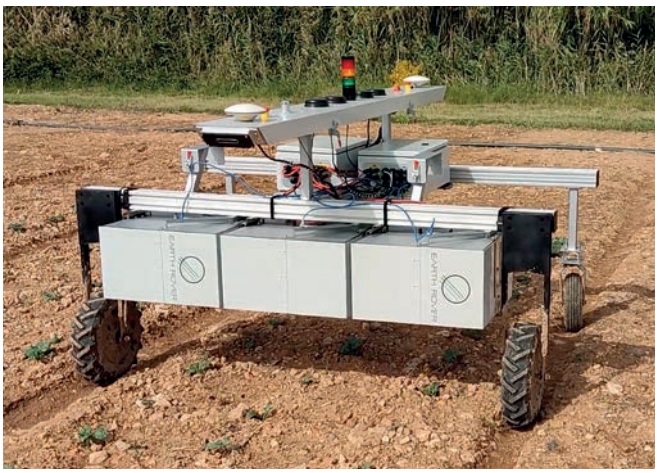
Collaboration essential for successful agri-robotics

By: Eliot Dixon
Head of Engineering
at Agri-EPI Centre

Robotics has several strong applications in agriculture, especially in scenarios where systems can enhance the productivity of a shrinking workforce or can offer production efficiencies to the farm. However, to be successful in these applications the systems created need be reliable, in terms of long-term physical robustness but also in the ability of their control software to handle the very wide variety of scenarios they will encounter in a farming environment. This means the robots must be both well designed and well tested to meet the needs of farmers. This includes a design which emphasises safety and reliability.

Good design requires a deep understanding of the needs and requirements of farmers and their farming systems. This extends from the core values held by a farmer, such as safety, which dictate their decisions; through to very specific requirements created by the unique combination of their way of working and the land they work. If this understanding is not achieved for a farming system, then there is a very high chance that the eventual product will be unsuitable, either creating a failed product or a long development timeline to solve the deficiencies. Gaining this understanding should come through working with a wide variety of farms within the target market for the technology, not just a small handful. In many agricultural sectors this design stage is especially important due to the limited testing season and ability to iterate on the design.

Testing is also well understood to be important to creating a reliable product, and in agriculture this does require a close collaboration with farmers to ensure that the robot meets their needs. As these are complex machines, which are also often dangerous if not created with a strong safety process, the testing regime should also be rigorous enough to ensure that the system will



function to the desired reliability for all the design requirements. A rigorous testing regime would usually require multiple tests for each requirement across multiple operational scenarios such as different weather conditions, soil types, dangers, failure modes, crops etc. Failure to complete this testing will certainly result in the robotic system encountering situations which it is unable to function within, which may create unfortunate repercussions for the user or manufacturer. Unfortunately, completing this massive number of tests requires a range of test facilities, some of which might be beyond the capability of a company focussing on a small range of agricultural applications.

In our 2021 hackathon we explore safety and security. Outcomes are discussed in our white paper here: Hackathon white paper

As mentioned, good design and testing is essential to creating successful products, but this unfortunately comes with a high cost. Doing this for the wide range of complex operating scenarios in UK agriculture, as well as the short testing cycles, is driving up the cost of developing agricultural robots. There are a multitude of Agri-robotics companies in the UK creating their systems from almost the ground up, each of which are individually bearing the cost in time and money of this development. This creates barriers to adoption in terms of high costs, a limited set of operations which can be conducted by robots, or low reliability due to poor engineering, and is increasing the amount of time it takes for products to get to market. As in all development the saying “Good, Cheap, Fast. Pick two”, is very much in action here but some very pressing needs mean we must find ways to break that deadlock.

Collaboration enables future opportunities for robotic systems

The obvious solution for this deadlock is to massively increase collaboration between agri-robotics developers. This has been proposed for many years, but we are yet to see a viable solution to this. Direct collaboration is currently difficult for commercial reasons with developers competing for the same money, but also for technical reasons where it is challenging to share components between robots. Perhaps a solution for this is to build an ecosystem of adaptable, compatible, components and platforms which can be used to create a multitude of agricultural robotic systems. This ecosystem of components would also be able to be robustly tested to ensure reliability when integrated as part of a larger system. Thus, the costs of development would be increasingly shared, without any single robotics manufacturer losing income as they are all developing for specific agricultural niches. Using a set of well proven components would allow developers to focus on ensuring good understanding and design for specific problems in agriculture, while also allowing for easier integration and testing of the robots.

Robotics in agriculture is a promising field, and with the right design and testing, as well as collaboration between developers, it could be a great success. By understanding the needs and requirements of farmers and using that to create an ecosystem of components and platforms, robots can be developed which are high value, robust, reliable and safe. With the right approach, agricultural robotics could benefit farmers across the UK and worldwide. Read our robotics and automation article to understand more about how we can support you to develop a robust well tested solution through collaborative R&D today.

Funding opportunities

Farming Equipment and Technology Fund Grants

The Farming Equipment and Technology Fund is part of the Farming Investment Fund.

It offers grants for specific items of equipment to increase productivity, boost environmental sustainability and improve animal health and welfare.

Farmers, foresters and growers in England, including contractors to these sectors, can apply for a grant between £1,000 and £25,000. Grants go towards the cost of specific items from a prescribed list.

Grants guidance

The Farming Equipment and Technology Fund 2023 is split into 2 themes:

Productivity and Slurry grant

> The items in this list improve agricultural sustainability and horticultural and forestry productivity, helping farmers use less inputs, reduce emissions and cut waste.

Find out more about this grant

Animal Health and Welfare grant

> The items in this list offer improvements in the health and welfare of livestock, potentially helping farmers improve biosecurity or decrease environmental stress.

Find out more about this grant

Ground breaking project to breed low-methane sheep

A pioneering project to breed an ultra-low emission sheep is about to start in Hertfordshire.

Precision-farming and innovation experts, Agri-EPI Centre are working with sheep-breeder, Rob Hodgkins of Kaiapoi Farm in Hertfordshire to measure emissions from a group of Romney rams and identify those that produce the least methane. Rob will select the rams with the lowest output and breed from them, creating youngstock which should also produce less methane.

The project, funded by Innovate UK, builds on work already done on Romney sheep in New Zealand, which demonstrated that methane emission levels could be a heritable trait in sheep. The Kaiapoi flock has strong genetic links to the animals involved in that research project, and it is predicted that the flock's methane production could be reduced by up to 25%

SRUC will oversee in-field methane measurements by holding each animal in a portable accumulation chamber (PAC), collecting the gas it emits over the course of one hour, breaking it down by type and analysing it. The project will also examine increasing meat and wool yield with a view to reducing the amount of carbon produced per kilogramme of meat and wool (1.4kg of wool stores 1kg of carbon).

Ross Robertson, head of mixed farming at Agri-EPI Centre said: "Methane emissions from livestock production are an important contributor to climate change, and farmers are under pressure to act. Innovative farmers like Robert could provide huge benefits to the UK and international sheep sector, and to the pursuit of sustainable food production.

"Agri-EPI Centre conducts trials with farmers across the UK to test innovations and to learn about their current and anticipated needs. In the case of sheep, valuable rams with high estimated breeding values (EBVs) may still be producing high levels of methane, but if we can breed a demonstrable reduction into the system, the potential for climate change mitigation and for the economic health of the sector is very strong indeed."

Rob Hodgkins from Kaiapoi Farm, said: "This project is great because it demonstrates how livestock producers can be part of the solution to produce food sustainably rather than being the problem. It's not the whole answer, obviously, but if we can cut methane emissions by 15% without reducing productivity and do so relatively quickly and cheaply, it would go some way.

"A few people are looking at methane reduction in cows, but our sheep-breeding project is unique. Because sheep give birth to only one lamb or set of lambs each year, we need to take a relatively long-term view of the project, but I predict that within ten years, domestic and global commercial interest in low-methane livestock will be very high. By doing the work just now, we will be in a strong position to maintain our commercial advantage.

"We are looking for that needle in the haystack: a low-methane, parasite-resistant sheep with a high growth rate and high lambing rates. As technology demonstrators, the more we breed successfully and test, the more we can determine the efficiencies gained by rearing cross-bred animals on a New Zealand system. There are hundreds of thousands of sheep this could be extended to across the UK.

"In a few years sheep producers will be able to look at what we have done, what we have achieved in terms of methane reduction and, as a breed society, individual or collection of farmers consider this as an avenue that they can go down too."

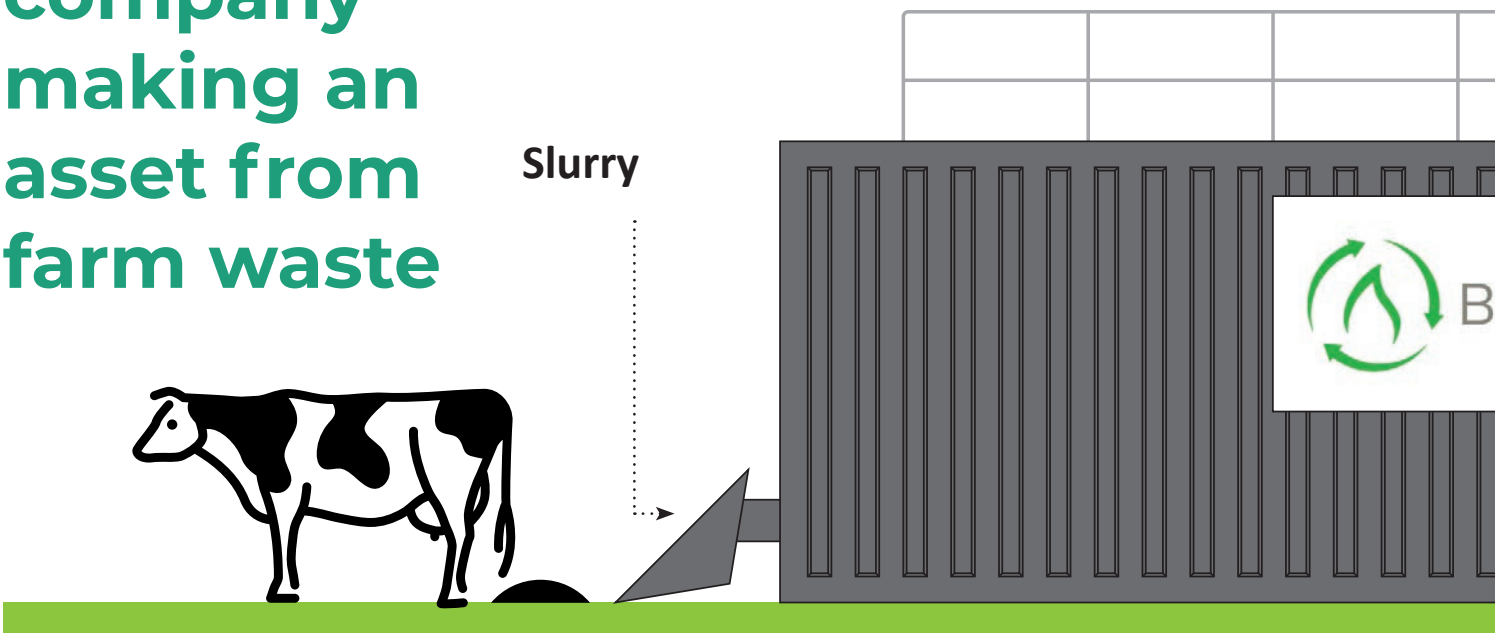
Read the farmer impact case study.

ITV: Ultra Low Emission Sheep with Agri-EPI and Kaiapoi Farm

Watch our Business Development Manager, Charlie Bowyer, and innovation farmer Rob Hodgkins on ITV discussing Defra's Ultra Low Emission Sheep research starter project at Kaiapoi Farm.

Watch the video

Young company making an asset from farm waste



A young company is working on a new way for farmers to make money from farm waste.

Somerset-based BioFactory are developing a modular anaerobic digester which can be scaled to any size of dairy farm. The company has been working with precision engineering and innovation experts Agri-EPI Centre, to develop and refine their system with a view to bringing it to the market.

Whereas anaerobic digesters – which ferment organic matter to produce biogas for heat and power generation – are well established in the industry, systems are often too costly and high-maintenance for most family farms.

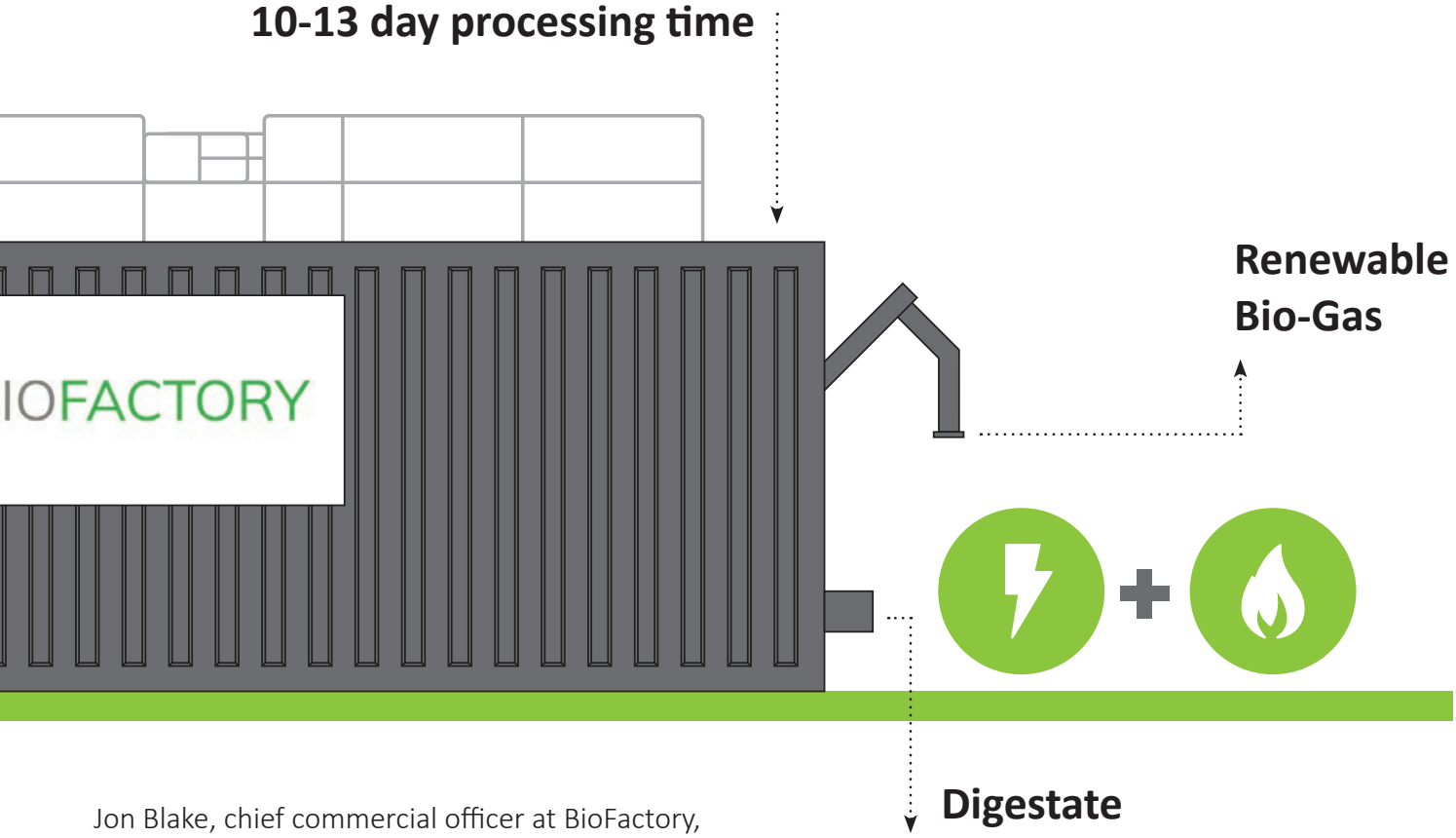
Agri-EPI Centre have helped BioFactory access funding, provided technical assistance, and introduced them to potential funders and advice to help them scale their product and sell it to dairy producers.

Having won funding from Innovate UK and Defra for a 12-month feasibility study via the Farming Innovation Programme, BioFactory are now raising working capital to commercialise the company fully, while Agri-EPI Centre continue to provide analysis and consultancy.

Charlie Bowyer, business development manager for livestock and aquaculture at Agri-EPI Centre, said: “Slurry is nutrient-rich, and returning it to the soil is a vital part of circular agriculture. Anaerobic digestion is a great way to add value to it whilst retaining nutrients, reducing GHG emissions and becoming more energy-independent.

“Digestate has long been recognised as a high-quality fertiliser, and the heat and power created from biogas can create a meaningful income for farmers or reduce their energy bills. Commercial AD systems are simply out of reach for most dairy farms due to capital and operational costs, as well as barriers such as planning permission and a changed subsidy landscape since the “AD-boom” of the early 2010s.

“Working with young companies like BioFactory is Agri-EPI Centre’s bread and butter; helping them develop a good idea into a successful business and providing solutions to farmers at the same time.”



Jon Blake, chief commercial officer at BioFactory, said:

"If you're a dairy farmer, you will always have slurry, but we can help turn it into an asset rather than a by-product. There is nothing to say that we can't resolve farming's impact on the environment as well. Our ethos is to build something simple and reliable for the dairy farmer. Our units are 40'-long shipping containers and easily scaled; if you want to increase your herd, you can simply add another reactor.

"We were so lucky to be in the right place at the right time. Our young company had been waylaid by Covid-19 when we came across a pot of funding for developing technology to help with net zero targets. Agri EPI-Centre helped us get hold of our grant and develop our product in real-life farming conditions.

"Even though the initial 12-month project has concluded, we are so pleased to continue our relationship with Charlie and his colleagues on laboratory analysis of the biodigestate, and with others at Agri-EPI Centre who are helping us with leveraging further funding and sales contracts."

BIOFACTORY


Eoin Sharkey- CEO


Jon Blake- CCO


Clare Beazley- CFO

Pick-ups for peace

In support of communities in Eastern Ukraine who have been severely impacted by the conflict over the last 12 months, the Central Plains Group are looking to send **100 used ambulances, pick up trucks or 4x4's laden with urgently required supplies from the UK to Eastern Ukraine** by 30 June 2023.

Driven with supplies

All those who participate will be invited to drive their donated vehicle to Lviv in Western Ukraine and our Ukrainian team will transport these to Eastern Ukraine where they are needed most.

UK farmers support directly to those in need

Mark Laird has dedicated his working life to supporting the growth of Eastern European farming and food security, developing and operating significant farming and food processing operations with a dedicated team of Ukrainian, Polish and UK staff.

Throughout this career Mark and the team have faced many challenges, however, none that compare to the current unjustified assault on Ukraine and International Democracy.

Mark and the team have been focussed on providing the Ukrainian people and forces with as much support as is feasibly possible since the outbreak of the war to help them overcome this unwelcome foe.

Through local connections the CPG team have developed a close relationship with local communities and support groups who have been providing aid to the communities most impacted by the conflict.

What can you do to help?

Speaking to the local communities impacted by the war, they urgently require supplies in many areas, from warm clothing, generators, ambulances and 4WD pickups and vehicles to deliver aid and supplies to the communities most impacted by the conflict.

Following previously successful delivery of reliable 4WDs to Eastern Ukraine we see a real opportunity for the UK Farming Community to provide direct support through donating their second hand pick ups or similar.

Donate supplies or your time

Whilst the primary focus is on identifying 100 vehicles, ambulances and 4WDs for donation we shall take the opportunity to load these vehicles with other donated or purchased aid items from generators, spare tyres and parts to winter jackets etc.

Donate funds to support

We know that not everyone has a spare vehicle or the time to drive one across Europe, however we shall still require further support in the form of funding to pay transportation or accommodation and flights back for some of the drivers.

This can either be donated directly to our funding account or by credit card through the **just giving web link** All funds will be managed by an independent committee.

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