

Together we can develop agri-tech solutions for sustainable dairy production



Agri-EPI's world class dairy platforms and farm network offer R&D facilities for every technology readiness level. Each location offers a multiskilled-set operating within state-of-the-art units. Turn to p2-7 to find out more.

Pictured, the Agri-EPI Centre Dairy team together with our farm collaborator, the Steanbow Farm team in the relaunched SWDDC premises.

WELCOME

Welcome to Agri-EPI, the centre for agricultural engineering precision innovation. We help to develop profitable and productive solutions to empower more sustainable farms. From bespoke validation trials to requirement, system development and grant funded projects, we are a partner of choice for agri-tech developers - from start-ups through to established companies. We have delivered over 100 commercial and 45 collaborative R&D agri-tech projects.

In the dairy sector our current research themes feature animal health and welfare | environmental sustainability | farm business sustainability | feed and productivity.

We offer three world-class dairy platforms for research and development through the technology readiness levels – the South West Dairy Development Centre (SWDDC) near Shepton Mallet relaunched in spring 2023, the Midlands Dairy located at Harper Adams University and the Calf Research Unit based on Scotland's Rural College (SRUC) owned Crichton Royal Farm, Dumfries. We summarise these facilities on p4 to 7. Further resources have been established on commercial dairy units as part of the Agri-EPI network of innovation farms, see p3.

In addition, we offer a wide range of support from supplying project and grant management services, technology business incubators and technical expertise to developing new international links, as well as establishing key industry relationships.

R&D service

- Consortia building
- Bid writing and scoping projects
- Research facilities
- Engineering space
- Data collection and ground truth assets
- Project management and delivery
- Specialist technical teams
- Life cycle analysis

Business support

- Membership ecosystem 250 industry networking and thought leadership events
- Office and research facilities under one roof
- International links
- Sustainability experts
- Investment advice

Commercial farms

- A diverse network of farm business and systems to trial technology
- End user agreement and system requirements
- Measurement and validation
- Technical advice and support
- Market insight and analysis
- Data capture and dissemination

Agri-EPI Centre is open to new collaborations and projects, both funded and private research.

To discuss potential opportunities get in touch: email team@agri-epicentre.com or call 0131 239 7100.



Agri-EPI Centre Head of Agri-Tech (Dairy)
Robert Morrison

"We've found the Agri-EPI Centre has a great multi-skilled set of people who are successfully enabling us to work towards taking lameness control to the next level with the Hoofcount automatic footbath. Initially they supported us with bid writing, while they are now providing research facilities at the SWDDC plus two or three commercial test farms, continual measurement and verification, comprehensive data capture, and overall, fantastic project management."

Hoofcount Director, **Anthony Marsh**

The Agri-EPI Commercial Network of Dairy Farmers

Agri-EPI Centre has enlisted a network of farms spread throughout the UK to participate in the the Agri-EPI Innovation Farm Network, writes Robert Morrison, Agri-EPI Centre Head of Agri-Tech (Dairy).

The innovation farm network was developed by Agri-EPI from the desire to 'close the gap' between research and the end-user, by creating a platform to host research projects and evaluate developing technology in a commercial farm environment, rather than in a simulated or research environment. Each farm has technology deployed to measure variance at every stage of production, understand inefficiencies within the system, and inform the ag-tech industry to direct their research to those areas.

The network is diverse, comprising different systems, sectors and business size. Meet two of them.

Mackies Farm, Westertown, Aberdeenshire

Head cattleman, David Smurthwaite is responsible for the 325 Holstein cows and 300 youngstock including replacement heifers at Westertown Farm, the home of Mackie's of Scotland. David's herd is run in a fully automated voluntary robotic milking system, which sees production of nearly 100% of the herd's annual 13m litres of fresh milk used in Mackie's ice cream.

Mackie's has a track record of embracing innovative technologies. For instance, the company was an early adopter of renewable energy, which now sees it generate more than twice the energy it consumes. Furthermore, in 2022, the company installed low-carbon refrigeration, a move that is expected to reduce its refrigeration-related energy usage by up to 80%.

The agricultural arm of the business has also demonstrated a similar approach to technology adoption. For example, as a member of the Agri-EPI innovation network, Mackie's recently conducted a successful trial of ear tags that monitor the temperature and activity levels of young calves, yielding valuable insights.



David says: ***"The Mackie's farm's willingness to trial and adopt new technologies is one of its great strengths. For example, the voluntary milking system we use has been in place for over 20 years, which made it one of the first robotic milking farms in the UK. This desire to be at the forefront of farm technology is assisted by our being part of the Agri-EPI Innovation Farm Network."***

Godminster Farm, Bruton, Somerset

Farm manager, Peter Cheek is responsible for the low input, organic unit carrying a 300-cow herd. He uses a mix of Friesian, Scandinavian and Fleckvieh semen to breed a cow capable of good yields with high health status and fertility from grazed grass and forage. Milk is processed in to Godminster cheese. He is particularly interested in herbal leys, experimenting with different mixes, establishment methods and grazing regimes.

Peter says: ***"We value the opportunity to be part of the Agri-EPI Innovation Farm Network. We believe collaboration is vital to provide agri-tech companies with a commercial environment in which to test their solutions and provide a foundation for future dairy innovation."***





Agri-EPI Centre Dairy Technical Manager
Mike Thomas

The South West Dairy Development Centre (SWDDC)

Promoting sustainable milk production



Agri-EPI's state-of-the-art South West Development Centre presents a fresh vision for the UK dairy industry. The resource offers a truly innovative environment for developing, testing and demonstrating new technologies and techniques to support sustainable, efficient, high health and welfare, cost-efficient milk production.

Located close to Shepton Mallet in the heart of the region's milk field, the unit features a typically sized 180-cow herd run on a commercial basis and provides a platform for higher TRL developers.

Spring 2023 saw the Centre's relaunch following an extensive upgrade to harness the power of automation, robotics and sensor technology. The developments include the move to a high welfare free access system providing the opportunity to crucially integrate Lely A5 robotic milking systems with precision grazing and also combine with the existing GEA robotic feeding system. The Galebreaker side curtains are completely controlled by temperature, wind speed, wind direction and rain sensors to ensure that the climate within the building is continually optimised.

Supported by Innovate UK, the modern building and cutting edge facilities are led by Agri-EPI while the herd is owned and managed by the Christensen family, trading as Steanbow Farms and noted throughout the farming community for their efficient dairy and poultry enterprises.

The Centre key areas of focus are to:

- Provide state-of-the art facilities for research, development and demonstration with an emphasis on optimising productivity
- Integrate robotic milking with precision grazing
- Demonstrate profitable and resource efficient milk production techniques
- Demonstrate the highest standards of animal health and welfare and how technology can be used to optimise this
- Demonstrate routes to sustainable milk production by adopting circular dairy principles in all aspects of the production process

The centre operates as a commercial farm supplying milk to local processors, Barber's Cheese.

The SWDDC features an excellent conference facility; it provides panoramic views of the cow housing together with a modern meeting environment. A viewing gallery on one end enables delegates to step out and watch the cows going about their daily lives without disturbing them.





The Centre's drive to use precision technology is reflected in the variety of ground truth assets, sensors and data sources that are located across the site. The assets validate, measure, and collect data at an individual unit of production level providing a controlled facility to trial innovations.

The technical team based at the centre are on-site to support on the delivery of projects and guide developers through the innovation process, providing technical support and industry advice, project co-ordination, data extraction and interpretation. Our goal is to ensure technology is developed to be robust and relevant to meet the challenges and requirements of the end users.

Our wide-ranging set of facilities, equipment include:

Activity monitors feature on each cow's Lely collar and a smaXtec bolus provides early detection of changes in her behaviour, including rumination rate, body temperature, resting time, water

intake and crucial information on fertility.

MIRICO's ORION CH4 system is located in the grazing paddocks to monitor methane emissions, both continuous as well as intermittent. The system has been developed to deliver reliable and highly sensitive measurements during adverse weather conditions.

Soil sensors located across the grazing platform measure and report moisture and temperature at six levels to a depth of 60cm.

Lorawan sensors monitor weather conditions, greenhouse gas emissions, water use and other data points.

Lely's Horizon software programme calculates deviations in key parameters that reflect health changes. The data featured in the calculations includes milk yield, colour conductivity, cow activity, ruminations and time away from the robot. Horizon also provides an overview of all udder health attentions over the last 24 hours enabling fast treatment.

Hoofcount footbaths use a sensor counter to automatically flush out and replenish after a set number of cows have passed through to maintain optimal hoof health.

Please contact Robert Morrison, Agri-EPI Centre Head of Agri-Tech (Dairy), robert.morrison@agri-epicentre.com for more information.

Hoofcount, UK market leader for automatic footbaths, has been awarded £250,000 of innovation funding to develop an early detection lameness monitoring system from UK Research and Innovation (UKRI), part of Defra's Farming Innovation Programme. Work commenced in spring 2023.

This project is designed to develop a system utilising computer vision and machine learning that can daily visualise changes to foot health and in turn make early detection of any potential issues caused by a range of issues including digital dermatitis. Early detection will enable farmers to make earlier treatment.

The funding is providing us with the opportunity to work with Agri-EPI at the SWDDC in collaboration with farmers, the Centre for Machine Vision (CMV) at the University of the West of England, Bristol and Bristol Robotics Laboratory. Agri-EPI is proving to be a great partner; it's team initially gave us the confidence to apply for the funding and followed through from bid writing to keeping us on track with the necessary developments.

Hoofcount Director
Anthony Marsh





Credit: HAU

Agri-EPI Centre Dairy Project Specialist
Duncan Forbes

The Midlands Dairy Research Centre

located at Harper Adams University

The next generation of dairy housing and management

A joint venture with Harper Adams University at its Newport campus in Shropshire, our world-class dairy cow research and development centre brings together:

- Unparalleled expertise in cow behaviour and welfare
- Fundamental research facilities for animal preference
- Experimental design expertise, statistical analysis and reporting
- Business development opportunities for new technologies and prototype trials

The Centre provides a highly adaptable space to enable cow behaviour research. The unit allows cows access to a variety of lying areas and preferred surfaces with the ability to precisely track movement, nutrition and milk yield.

- Capacity for up to 60 cows in a flexible space which can be split into smaller groups for control and treatment
- Indoor space to enable cow behaviour and controlled environment studies in two 26m x 15m trial areas
- Closed non-grazing outdoor space for loafing, ruminating and resting
- Automated milking system
- 3D body condition camera
- Neck and leg mounted cow activity monitors
- Robotic slurry scraper
- Automated feed efficiency analyses

Added together and the Centre's cutting-edge facilities offer a wealth of opportunities to enable scientists, technology developers, agri-engineering companies and the wider dairy industry to research, trial and develop improved indoor systems, supporting cow wellbeing, increasing yields and sustainable UK milk production.

Oxi-Tech has developed a powerful disinfection system that uses only water and electricity and mimics a natural process called ozonation. Ozonated water leaves no residues, it has the ability to destroy bacteria and viruses and subsequently removes the need for toxic chemicals routinely used on dairy units.

As a start-up tech company, we were awarded £105k from Innovate UK after it saw the potential to integrate the system into dairy robots, as did the Agri-EPI Centre which has opened the door for us to trial the system at HAU under the care of Prof Mark Rutter and supervision of the unit's vet, Dan Humphries.

The process has been incredibly impactful. HAU, a global leading university and R&D centre has provided validation and some real credibility around the science and testing. We have also benefited from the opportunity to work with DeLaval at a senior global level as well as Agri-EPI experts including Rob Morrison and the team who have brought together the partner collaboration in to one package, provided project management and facilitated the product's development.

Oxi-Tech Technical Director
Luke Rutterford



Calf Research Unit

Pioneering early-stage calf health and care to optimise lifetime productivity and herd sustainability

Agri-EPI Centre's calf research and innovation platform is focussed on improving calf growth, health and welfare for increased resilience, yields and longevity of our national dairy and beef herds.

This facility is based at Crichton Royal Farm, Dumfries, a unit owned by the Scotland's Rural College (SRUC) and where calves from its award-winning 450-head Langhill dairy herd are reared.

The unit's key technology provision combined with SRUC's analytical expertise provide unique research and development opportunities for dairy farmers, feed manufacturers, milk processors, retailers, pharmaceutical and technology companies. Areas of research include:

- Feed trials
- Microbiome
- Growth performance
- Nutrient digestibility
- Blood biochemical indices
- Rumen development

Researchers have access to comprehensive, in-depth data of calf activity, development and health via a combination of animal-mounted sensors, automated feeding stations that measure weight gain, forage, milk, concentrates and water intake.

Agri-EPI Centre Business Development Manager – Livestock
Charlie Bowyer



Credit: SRUC

WellCalf is a calf-health monitoring system developed by Smartbell to provide early disease detection for pneumonia and scours. Smart ear tags monitor activity, behaviour, and temperature to provide alerts at early onset preclinical symptoms, allowing farms to respond quickly and reduce the impact and spread of disease.

Development and trials across 25 commercial farms were completed in early 2022, prior to commercial launch. Case studies showed an 85% increase in early pneumonia detection, a subsequent 35% reduction in anti-microbial use and 14% improvement in youngstock growth rates.

Agri-EPI helped facilitate the partnership between Smartbell, SRUC and Parklands Veterinary group, and dissemination of results. Throughout development, Agri-EPI's feedback and test facilities from their farming network ensured the product worked well across different farm environments.

Smartbell Chief of Operations
Jose Chitty



8 Empowering world leading precision agricultural technology






Collaboration is key to agri-tech development. In addition to our facilities, we host on-farm events and networking meetings. We also have an industry and farmer network of over 250 members. Together we can develop agri-tech solutions for sustainable dairy production.

Get in touch with our dairy innovation team to find out more and discuss opportunities; team@agri-epicentre.com



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