# Improving Agri-tech's adoption in UK Agriculture


2025 CARAS Agricultural and Rural Research Scholarship Report

Andy Newbold ARAgS, Hon FIAgrE

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## 1.0 Executive Summary

Over the past two decades, the UK government has invested heavily in agri-tech through initiatives including the Agri-Tech Strategy, Agri-Tech Catalyst, Farming Innovation Programme, and new innovation and equipment grants. Despite this, widespread on-farm adoption remains limited, with only a small number of technologies—most notably auto-steer and auto-section control—achieving significant uptake.

Through the Rural Research Scholarship, I examined the gap between agri-tech innovation and practical farm adoption. Drawing on discussions with farmers, agronomists, engineers, manufacturers, European innovation clusters, and educational programmes, the research focused on:

- Identifying the economic, technical, social, cultural, and organisational barriers to adoption.
- Developing a practical roadmap to accelerate uptake based on proven models and cross-disciplinary approaches.

Key barriers include:

- Technologies insufficiently aligned with real farm needs.
- Poor connectivity and fragmented data systems.
- Unclear or weak economic returns.
- Subscription models that undermine trust.
- Cultural resistance to change and risk.
- A disconnect between research outputs and practical farm solutions.

Successful adoption is consistently associated with:

- Farmer-led design and co-development.
- Incremental, systems-based implementation.
- Strong training, support, and peer learning.
- Multidisciplinary collaboration.
- Long-term institutional backing.

The findings suggest that future progress depends less on funding individual technologies and more on building connected ecosystems where farmers, advisers, engineers, educators, and manufacturers collaborate to identify problems, test solutions, and share results transparently.

## 2.0 The Challenges & backstory

### 2.1 Policy and investment context

UK government investment in innovation for agriculture (Agri-tech for short) is substantial and long-running. The Agri-Tech Strategy (2013) and Agri-Tech Catalyst (2014) pushed significant funds into research and early-stage commercialisation, while the Farming Innovation Programme and recent equipment and innovation grants signal ongoing commitment. However, as my interviewees repeatedly noted, funding alone does not guarantee on-farm impact.

The closure of the Silsoe Research Institute in 2006 still hangs over the UK's applied agricultural engineering capacity. Several European counterparts commented that they now see more concentrated, networked engineering expertise in places like Germany's Agrotech Valley or European field robotics communities than in the UK's fragmented landscape.

The scholarship has effectively been an attempt to understand how the UK might rebuild not just "research projects", but an innovation capacity and culture suited to today's farming challenges.

### 2.2 Economic and practical barriers on farm

In the "technology supergroup" discussion with leading UK practitioners – including Harry Henderson, Clive Blacker, Charlie Nicklin, Kit Franklin, Ray King and Kieran Walsh – the economic and practical barriers were articulated bluntly.

- *High cost and unclear payback:* Many technologies present attractive technical features but, once realistic margins and risk are considered, deliver only marginal or even negative financial returns;

- *Subscription models* for mapping and software erode profitability and trust, particularly when value is not consistently demonstrated;

- *Complexity and usability*: Tools that are difficult to learn or unreliable under farm conditions quickly fall out of use; farmers prize ease-of-use and robustness above almost everything else;

By contrast, auto-steer and auto-section control were held up as success stories: easy to understand, easy to use, with visible benefits in workload, accuracy and input savings.

In conversation with David Whattoff, who has worked on variable depth cultivation and precision soil management, similar themes surfaced. When technologies solve clear, felt problems – fuel use, soil structure, seed establishment – adoption follows. When they are over-specified, expensive and poorly aligned with real needs (his example of an overly complex weather station), they sit unused.

### 2.3 Connectivity, data and the research–practice gap

A second layer of challenge concerns infrastructure and data:

- Connectivity: Poor rural cellular coverage remains a major constraint on precision agriculture and connected machinery. Some OEMs are now experimenting with satellite connectivity (e.g. Starlink on tractors), but many farms still struggle to maintain reliable data links.
- **Data culture and open systems**: While there is significant potential in collective data for AI-driven decision-support, cultural barriers around data sharing and limited interoperability between systems slow progress
**- Research misalignment:** Agronomist Kieran Walsh highlighted the divergence between some environmental or biodiversity research and the yield/profit needs of commercial farmers, and the lack of applied, "whole-farm" research directly aligned with profitability and resilience.

**4.0 Social, cultural and psychological barriers**

Conversations with Paul Frobisher at Groundswell Festival and Kieran Walsh revealed that adoption is as much about people*as technology .

- *Fear of change* and contradictory advice can paralyse decision-making.
- Farmers' motivations can be understood through the ABCM framework (Autonomy, Belonging, Competence, Meaning) – which explains why some innovators push ahead regardless of peer opinion, while others are strongly influenced by community norms and branding.
- There is a need for *respectful engagement*, acknowledging regional cultures of thrift, risk and identity, rather than delivering one-size-fits-all "technology evangelism" .

European interviewees repeatedly stressed the *conservative nature of farmers* and the necessity of *sensible risk-taking*, staged trials and robust support when introducing new systems, especially autonomy and robotics.

## 3.0 The Evidence: Themes

### 3.1 Cross-Curriculum – Learning Across Domains

A key finding is that effective agri-tech adoption depends on learning that crosses traditional educational and disciplinary boundaries.

At Groundswell, innovation appears simultaneously in regenerative methods (changes to rotations, cover crops, livestock integration) and enabling technologies (drones, AI, camera hoes). Farmers learn as much from fireside chats, informal field-edge conversations and shared experimental plots as from formal presentations.

This is "cross-curriculum in the wild": agronomy, ecology, business, psychology and technology interwoven.

In European robotics education, the Field Robot Event co organised by Professor Matteo Matteucci provides a living example of cross-curriculum practice. Students from AI, robotics and agronomy work together on tasks such as autonomous navigation and fruit detection, learning not just algorithms, but field constraints, crop biology and machinery realities. This Pan-European Agri project explicitly seeks to build an experimental platform for sustainable agriculture, joining field experimentation with advanced robotics and data science.

The Claas Stiftung, via Sylvia Looks, has supported the Field Robot Event for nearly 20 years as a deliberate investment in cross-disciplinary, agriculture-focused STEM education. Here, agricultural engineering, computer science and autonomy are not siloed courses, but lived practice.

***Implication for the UK:***
Organisations like the UK Agri-Tech Centre and Agri-TechE can strengthen their impact by more deliberately curating and funding cross-curriculum experiences – for example, farmer-facing demonstrations co-designed by engineers, agronomists and behavioural scientists; or joint placements and hackathons where students from agriculture, computer science and business solve real farm problems together.

### 3.2 Sharing Ideas Across Disciplines – No Silos, Experience Other Worlds

Almost every successful model encountered during the scholarship involves people *stepping into each other's worlds*.

- At the Groundswell regenerative farming event, farmers, advisers, researchers and manufacturers meet in an unusually open environment. Farmers share failures and experiments, agronomists discuss holistic soil health rather than just products, and manufacturers listen to unfiltered feedback.
- In Agrotech Valley (Germany), Professor Henning Müller chairs a voluntary network that includes machinery companies, universities and research institutes, deliberately integrating different competencies over the Osnabrück–Münster region.

- In the European agricultural engineering community, Dr Boris Kettelhoit of Claas describes the need for an ongoing "community of practice" where electrical, mechanical, software and agricultural engineers question each other's assumptions and jointly decide which directions are worth pursuing.

The Field Robot Event again acts as a practical "other world": young engineers travel internationally, work in fields rather than labs, and interact with industry sponsors and farmers.

***Implication for the UK:***
The UK Agri-Tech Centre and Agri-TechE already convene mixed stakeholder events. Building on the scholarship evidence, they could:

- Increase structured "experience-other-worlds" opportunities, such as engineer-on-farm residencies, farmer-in-lab sabbaticals, or cross-sector working groups that stay together over multiple years.

- Use Groundswell-style formats (open discussions, field-edge case studies, visible experiments) more broadly, rather than relying solely on conference-style sessions.

**3.3 Multidisciplinary – Integrating Engineering, Agronomy, Data and Behaviour**

Several interviews showcased fully multidiscipline approaches:

- Kuhn's CEO, Thierry Creiur, described how their substantial R&D investment (over €50m annually) is channelled into innovations that combine mechanical design, electronics, data, and agronomic understanding, while staying tightly anchored to farmer value and reliability.
- Dr Boris Kettelhoit highlighted the complexity of modern agricultural machinery, which now integrates high-tech electronics, software, sensing and mechanical systems, and stressed that no single discipline can handle this alone.
- Professor Matteo Matteucci and his team explicitly mix AI, robotics and agronomy to address labour shortages and sustainability challenges in agriculture, seeing themselves as problem-solvers rather than "just" roboticists.
- Paul Frobisher brought in a psychological and social science lens (ABCM) alongside technology and regenerative agronomy, giving a richer view of farmer decision-making.

***Implication for the UK:***
The scholarship suggests that UK innovation bodies need to move from *"multi-stakeholder meetings"* to *multi-disciplinary teams with shared accountability*. For example:

- Joint innovation programmes where every funded project must include engineering, agronomy and behavioural/social science partners, plus a defined farmer reference group.
- Stronger ties between UK Agri-Tech Centre/Agri-TechE and engineering societies (e.g. IAgrE) to embed engineering disciplines more deeply within innovation projects, as seen in Agrotech Valley.

**4.0 Proven Models – What Actually Works**

Across the research, several proven models for innovation adoption emerged:

**4.1 Farmer-co-designed, conservative OEM innovation (Kuhn, Thierry Crieur)**
- Kuhn involves farmers from early development stages via focus groups and confidential prototype testing
- Products are only released once they are robustly proven internally; as a long-standing manufacturer, they cannot afford high-profile failures.
- Their strategy is to build smart, *energy-agnostic implements* that integrate with different tractors and fuels.

**4.2 Incremental, systems-based innovation** (Agrotech Valley, Professor Henning Müller)
- Farmers test new technologies on small plots, share results, and only scale up once reliability and fit within the whole farm system are established.
- Fully autonomous systems are introduced gradually via hybrid setups, with robust support (e.g. the 24/7 support model for milking robots)

**4.3 Community-based learning and regenerative experimentation** (Groundswell)
- Farmers place experimental plots near roads to "invite" neighbour curiosity and conversation.
- Events like Groundswell create non-hierarchical spaces for peer learning and trust-building, which contrasted favourably with more traditional shows.

**4.4 Educational robotics as capability-building** (Field Robot Event)
- Sustained support from Claas Stiftung and others has built a long-running community where multidisciplinary student teams tackle realistic, field-based tasks
- The event normalises collaboration across disciplines and countries, while keeping a clear link to real agricultural problems.

**4.5 Farmer-led, problem-first innovation** (Technology Supergroup)
- The December "technology supergroup" was unanimous that the best innovations start from real, financially rigorous farm problems – soil structure, drainage, labour, input costs – rather than technology looking for a market.
- Embedding engineers and developers in farming businesses, and presenting clear business cases, were key recommendations

These models are not theoretical. They are functioning templates the UK can learn from and adapt.

## 5.0 Conclusions and Strategic Roadmap

### 5.1 Synthesis: Why Adoption Lags

The scholarship has shown that the UK's technology innovation adoption gap is not due to a lack of ideas, funding or science. Rather, it reflects:

**Misalignment** between the locus of innovation (often distant from commercial farms) and the day-to-day realities of farming.

**Fragmentation and silos** between engineering, agronomy, data science, behavioural insight, and between research and farmers.

**Weak connective tissue -** insufficient farmer-led verification, limited cross-curriculum learning and too few spaces where practitioners can "experience other worlds" safely and repeatedly.

Where the ecosystem does manage to join these elements – as in Kuhn's co-design processes, Agrotech Valley's network, Groundswell's community or the Field Robot Event – adoption is stronger, learning is faster, and innovation is more grounded

### 5.2 The Role of Existing UK Models (UK Agri-Tech Centre & Agri-TechE)

Both the UK Agri-Tech Centre and Agri-TechE already act as important conveners of research, business and production agriculture. Building on the evidence gathered, they could:

**1. Deepen farmer-led, problem-first design**

- Create structured programmes where engineers, data scientists and researchers are embedded with farm businesses for extended periods, mirroring recommendations from the technology supergroup.
- Require funded projects to demonstrate clear "problem statements" and farmer-validated business cases upfront.

**2. Strengthen independent verification and demonstration**

- Establish an independent "proof and demonstration" arm that tests technologies on commercial farms, in different regions and systems, and publishes open, plain-language results.
- Use this to counter over-promising and build trust, mirroring the value placed on independent information by practitioners.

**3. Invest in cross-curriculum, multidisciplinary learning**

- Partner with universities, engineering societies and events like Groundswell to develop joint curricula and placements that cut across agronomy, engineering, data and behavioural science.
- Sponsor UK-based equivalents or satellites of initiatives like the Field Robot Event, with strong UK farm involvement.

**4. Adopt and adapt international proven models**

- Learn from Agrotech Valley's regional network model (companies + universities + farmers) and consider piloting a *"UK Agri-Tech Valley"* style initiative in a defined region, with clear membership and joint agenda.
- Explicitly connect with European engineering and robotics networks to avoid re-inventing the wheel and to give UK students and professionals access to "other worlds" of practice.

## 6.0 Proposal: A New UK Model – "Agri-Tech Adoption Labs"

Building on the scholarship findings, I propose a model that could be hosted or co-led by the UK Agri-Tech Centre and Agri-TechE:

*Agri-Tech Adoption Labs* – regional, farmer-anchored labs that:

**1. Start from farmer problems**
- Each lab begins with a structured process (using tools like ABCM to understand motivations) to identify priority problems in that region: drainage, labour, data use, specific crop challenges, etc.

**2. Bring together multidisciplinary teams**
- Engineers (mechanical, electrical, software, agricultural), agronomists, data scientists, behavioural scientists and farmers form a standing team committed for several years.

**3. Integrate education and capacity-building**
- Each lab partners with local universities and colleges, running student projects, placements and competitions modelled on the Field Robot Event, but explicitly tied to local farms.

**4. Use an incremental, systems-based approach**
- Technologies are trialled small-scale first; only when they integrate well into whole-farm systems (technical, economic, social) are they scaled, echoing Agrotech Valley's evolutionary model

**5. Provide independent verification and open reporting**
- Results (including failures) are shared openly in farmer-friendly formats – field days, short case videos, clear economic summaries – to build a bank of visible success (and learning) stories

**6. Connect nationally and internationally**
- UK labs would be nodes in a broader network, able to exchange learning with each other and with international partners in Europe and beyond, supported by organisations such as UK Agri-Tech Centre and Agri-TechE.

## 7.0 The Role of Professional Bodies

Professional bodies such as the Institution of Agricultural Engineers (IAgrE) have a critical role to play in turning agri-tech from a series of projects into a mature, joined-up engineering discipline for farming. They can act as the *engineering spine* of the ecosystem: convening mechanical, electrical, software and systems engineers who understand farm realities, and embedding them more systematically into programmes led by organisations such as UK Agri-Tech Centre and Agri-TechE. Through formal advisory panels, accredited project leads and technical forums on autonomy, connectivity and data standards, IAgrE can help ensure that the UK's agri-tech investments are grounded in sound, whole-system engineering rather than isolated gadgets.

Secondly, IAgrE can champion the *problem-first, farmer-embedded engineering approach* that repeatedly emerged from this scholarship. By encouraging and facilitating *"engineer in residence on farm"* schemes, co-funded with innovation bodies, IAgrE could place engineers inside commercial farms and agronomy practices for extended periods, ensuring that new concepts and prototypes are shaped by real soils, real rotations and real margins. Coupled with practical guidance on good engineering practice in agri-tech adoption – reliability thresholds, staged trials, safety, simplicity and clear business cases – this would give structure to many of the instincts voiced by practitioners in the technology supergroup.

Thirdly, IAgrE is well placed to support the *independent verification and multidisciplinary capability-building that* farmers and advisers say they need. Working with UK Agri-Tech Centre and Agri-TechE, IAgrE could help design and run neutral on-farm trials of new technologies, publishing plain-language technical and economic summaries that farmers can trust. In parallel, co-badged CPD and training with agronomy and data-focused bodies would help engineers engage more confidently with agronomy, behavioural science and farm business realities – mirroring the multidisciplinary practice seen in Agrotech Valley, Groundswell and the Field Robot Event.

Finally, if regional Agri-Tech Adoption Labs or similar initiatives are developed, IAgrE could act as their *technical custodian and amplifier* – helping design robust trial protocols, curating cross-lab learning about what works technically, and hosting an annual "adoption and engineering" forum for farmers, OEMs, start-ups and researchers.

In doing so, IAgrE would help shift the national narrative on agri-tech from one of technology-push and isolated pilots to one of *systems engineering, farmer-defined problems and long-term capability building*, aligned with the proven models identified through this scholarship.

## 8.0 Final Reflection

The Rural Research Scholarship has allowed me to bring together conversations from the field edge in the UK, innovation centres in Germany and Italy, and community events like Groundswell and the Field Robot Event. Across these very different settings, the same message recurs: *Agri-tech adoption is not about gadgets; it is about relationships, systems and shared learning.*

If the UK can harness its existing strengths – strong research base, active networks such as UK Agri-Tech Centre and Agri-TechE, and a diverse, innovative farming community – and combine them with the proven models observed through this scholarship, then the substantial public investment in innovation in agriculture can translate into tangible, scalable benefits for farmers, the environment and society.

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Harry Henderson, Head of Education & Partnerships, BASIS Registration.
Kit Franklin, C.Eng Senior Engagement Fellow at HAU
Ray King C.Eng Flynt Technologies

**10. About the Author:**

Andy Newbold ARAgS ,Hon.FIAgrE is a highly respected figure in UK and European agricultural engineering, known for his long service to the profession, advocacy for practical technical knowledge, and leadership within professional and industry communities.

He is a **Chartered Engineer and Honorary Fellow of the Institution of Agricultural Engineers (IAgrE)** — one of the highest honours the Institution can bestow, recognising exceptional contribution to both IAgrE and the wider agricultural engineering sector.

Andy's background combines technical engineering, publishing, events, and sector promotion:

- He studied **agricultural engineering at Harper Adams University** and, after early industry roles, founded **Newmac Ltd**, providing engineering compliance, CE/UKCA support, and safety consultancy to manufacturers.
- He established **FarmSmart Events and Publishing** (formerly Fusion Events), which delivers influential technical exhibitions such as Precision Farming, Tillage-Live and ScotGrass, and publishes specialist journals including *Landwards*, *Tillage & Soils* and *Precise*.
- He has held many leadership roles in IAgrE, including **President (2012–2014)** and involvement in council, finance, and governance committees, helping shape professional standards and knowledge exchange.
- In 2024 he was appointed **Secretary General of the European Society of Agricultural Engineers (EurAgEng)**, where he is charged with strengthening cooperation across academic, industry and national engineering societies throughout Europe.

His career spans technical events, publishing, and professional representation, with a consistent focus on **bridging engineering practice, safety, innovation and the needs of farmers and manufacturers** — making him a widely recognised voice in the advancement of agricultural engineering.

For further information please contact Andy@farm-smart.co.uk or +44 (0)7753 612294