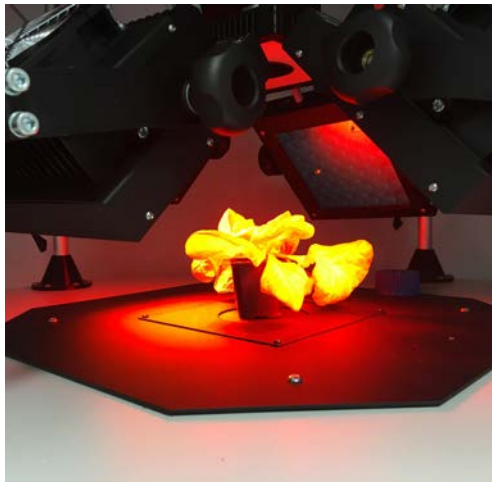

AGRI-TECH CORNWALL PROJECT

FINAL EVALUATION

A report from Ash Futures

October 2021

AGRITECH CORNWALL

European Union
European Regional Development Fund

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EXECUTIVE SUMMARY

This final Summative Assessment of the Agri-Tech Cornwall Project (ACP) has found that the project has been a well-regarded and important initiative to help support businesses across Cornwall & Isles of Scilly (CIoS) understand the potential and help develop products and/or services to meet the need for technological solutions within agriculture (agri-tech).

This evaluation has been undertaken over much of the programme delivery period, capturing the development of the project. Importantly, it has also captured the development of agri-tech activity over the past few years. The majority of business beneficiaries consulted as part of this evaluation felt that the project has been an important influence on the development of that nascent sector.

ACP represented a significant ERDF investment (c£8.9m) over a 4.5 year period, and was focused on increasing Research, Development and Innovation (RD&I) activity in agri-tech. The accountable body was Duchy College, part of the Cornwall College group, and supported by a range of delivery partners. Importantly, it brought together key research institutes across the region – Duchy College itself, Rothamstead Research, the University of Exeter and the University of Plymouth. These research partners were involved in developing and supporting collaborative research activity alongside industry partners.

In addition, Cornwall Development Company administered an innovation grant scheme – providing direct financial support to businesses wanting to develop agri-tech oriented products and/or services. Unlocking Potential also administered a graduate placement scheme – helping to place graduates within agri-tech focused roles.

Due to the eligibility criteria of European Structural Funds, it was not possible to work directly with agricultural producers (farmers and growers). Therefore, the intention was that the project would also involve extensive dissemination and knowledge transfer activity, particularly around the outcomes of the collaborative research projects (where IP and commercial confidentiality interests allowed). Finally, the project also involved capital investment in the establishment of the Future Farm Dairy Platform at Duchy College's Stoke Climsland campus. This important facility had been planned for many years but unlocked through the ERDF investment made.

The latter part of the project was affected by the Covid-19 pandemic, impacting on the latter stages of some research activity, as well as obviously forcing the dissemination activity online.

The evaluation has concluded that, as an RD&I project, it has directly stimulated greater levels of research and innovation within CIoS, specifically focused on the development and application of technological solutions for many of the issues currently facing agriculture. It has directly responded to ERDF Priority Axis One (Promoting Research and Innovation) and we have good confidence that it has contributed to a great extent to the sub-priorities of Priority 1b:

- promoting business investment in Research and Investment
- developing links and synergies between enterprises, research and development centres and the Higher Education sector
- supporting technological and applied research

Overall, the delivery partnership has worked effectively, and much credit goes to Duchy College and the Programme Director for continuing to focus on, and promote, joint working. The scale of SME engagement delivered through the project has been significant with over 100 enterprises supported, and there is good evidence that the project has directly encouraged some businesses to enter this space. Additionally, the relationship between the research partner and business will

continue beyond the project in several instances. In other instances, further funding/investment will be required to sustain activity.

Programme Context

The policy review undertaken as part of this evaluation has concluded that the wider economic, environmental and associated policy changes that have taken place since the project started has strengthened the original justification for the ERDF investment. The evaluation evidence – combined with this review – suggests that continuing to support the development of agri-tech is now actually more pressing than at the outset of ACP. ***This is a key learning for policy makers.*** In our view the combined impact of the move away from production subsidies to payments for public goods (post CAP), and the increasing awareness of the environmental impact and carbon emissions of agriculture, provides the justification for continued public investment and support.

Programme Targets

The delivery against the contracted ERDF output targets has been quite dynamic over the project period. There have been several reasons, including a relatively slow start due to recruitment into research posts, the process of identifying eligible SMEs (and from a smaller pool than originally envisaged), and the need to stimulate interest in the innovation grant and graduate placement strands.

Consequently, the project has submitted several Project Change Requests (PCR) to the Managing Authority which have changed the output targets over the period. The project partnership has worked hard to meet those revised output targets and has achieved a significant scale of delivery.

The project is expected to significantly exceed output targets such as the number of enterprises assisted (C1), new enterprises supported(C5), the amount of leveraged private investment (C6), the number of enterprises cooperating with research institutes (C26), and both new to market products (C28), and new to firm products (C29). The achievement of ERDF output C2 (enterprises receiving financial assistance) has been under some pressure through the project period, further complicated by the impact of Covid-19, particularly for businesses to be able to take on a graduate placement. The downward revision in the latest PCR allowed a more achievable target that has taken into context the difficulties presented by Covid-19.

The commencement and build-out of Future Farm has been associated with difficulties throughout the project period. Initially the delivery was complicated by the financial position of the accountable body. Latterly, the construction was disrupted by Covid-19 associated restrictions. However, Duchy College, supported by the Strategic Steering Group, remained committed to its delivery and was able to complete construction in 2020. Early indications of the scale and importance of research being undertaken through this key facility are encouraging, with many businesses continuing to be involved in research activity through Future Farm.

Programme Delivery and Management

This evaluation concludes that the project has been well managed by Duchy College and the Programme Director. It was worked diligently to ensure that the project has met its contractual targets as well as providing a good level of strategic leadership. It worked hard on behalf of the project partnership in seeking clarity on several fundamental matters and has provided commitment and momentum to the project when it has faced some difficult challenges.

The Strategic Steering Group has acted as a good sounding board and source of advice and guidance for the project, as well as reviewing the collaborative research proposals as they came through. It is relevant to highlight that there was some tension between this role and some of the

research delivery partners in the early stage of the project. This was largely resolved or managed as the project progressed. The Programme Management Group has been an effective forum in which delivery partners were able to come together regularly to discuss progress and any issues.

It is relevant to highlight that each of the research partners came into the project from different cultural and organisational perspectives, particularly with regards to historical engagement with SMEs and experience of engaging with SMEs in an applied research environment. One consequence was a different 'pace' of initial SME engagement at the start of the project across the partnership. In our view, it may have helpful if there had some central business engagement resource which could have helped coordinate activity in a more efficient manner. ***We feel that this is a key lesson for those designing and implementing similar multi-partner interventions.***

Overall, the feedback we have received from beneficiary businesses has been positive. Where there have been any negative comments they tended to relate to pace. For the collaborative research projects, this related to differences in the timeline between commercial requirements and the academic need for robustness.

Programme Outcomes and Impact

The conclusion of this evaluation is that ACP has made a significant difference to the development of agri-tech within CIoS, and with considerable potential in future. Based on the feedback from a range of stakeholders and businesses, ACP has played an important role in developing and promoting opportunities within agri-tech.

However, it is also important to recognise the project was effectively an RD&I intervention and that, in many instances, support was provided to businesses that were at an early stage of their development, particularly for those involved in collaborative research. Consequently, the commercial impact to date has been mixed. It is perhaps realistic to expect that for some businesses there will be a minimal/negligible commercial impact. However, there are other examples where quite clearly the support provided through ACP could have a transformational impact. This concentration of positive commercial impact in a small proportion of the businesses reflects the implicit risk in such interventions and reinforces the original justification for support.

It is widely felt that the potential withdrawal of support once the project completes at the end of December 21 could result in a loss of momentum at an important juncture. Specifically, many businesses felt there was an absence of support to help them commercialise or monetise their products and services. This may impact the potential legacy and fully deliver a sustained impact. ***Again, we feel this is an important lesson for policy makers in terms of any future focus for ongoing support.***

In our view it is also important to recognise that the impact of the project's activities will extend far beyond the commercial/economic impact. Clearly, many of the collaborative research projects – and several of the projects supported through the innovation grants – are attempting to address and alleviate the environmental impact of agricultural production. Therefore the potential impact will include these environmental and carbon benefits, which could potentially be more significant in societal terms.

Ash Futures were commissioned to undertake the Summative Assessment for the Agri-tech Cornwall project (ACP). The project is now a 4.5-year c£11.8m initiative to increase Research, Development and Innovation (RD&I) in Agri-tech activity across Cornwall and the Isles of Scilly (CIoS). It is part-funded by c£8.9m of support from the European Regional Development Fund ('ERDF').

The Cornwall Agri-tech Programme

Management

The accountable body for the project is Cornwall College, supported by a range of delivery partners.

A Programme Director within Duchy College's Rural Business School (part of Cornwall College group) has been in place to manage the delivery of the project, supported by a small team of support staff. Overall, the project has been overseen by a Strategic Steering Group (SSG) which has had a wide representation across delivery partners, wider stakeholders and experts and practitioners from within the field of agriculture and agricultural technology – with a good level of private sector representation.

A Project Management Group (PMG) was also in place which allowed the delivery partners to come together on a regular basis to review progress of delivery, discuss issues, better understand activities across the partnership etc.

The project also had a Project Administration and Compliance (PAC) group. This group was effectively a sub-group of the PMG, comprising project administrators, compliance and support officers to ensure compliance with ERDF and Managing Authority requirements.

Views on the effectiveness of how the project has been managed and delivered are discussed later in this report.

Delivery

The ACP project was delivered across a partnership of research institutions and delivery organisations located within the South West, but with a specific delivery focus within CIoS. The delivery partners were:

- Duchy College (part of Cornwall College group) – acting as lead organisation for the project, as well as a partner involved in collaborative research projects;
- The University of Exeter – involved in collaborative research projects;
- The University of Plymouth – involved in collaborative research projects;
- Rothamsted Research – involved in collaborative research projects;
- Cornwall Development Company – the managing organisation for the innovation grant scheme;
- Unlocking Potential (part of Cornwall College group) – the managing organisation for the graduate placement scheme.

The ACP has had three primary strands of activity:

- Collaborative research – specific research activity focused on a particular agri-tech related issue, involving collaboration between one (or more) research delivery partners and eligible SME businesses (one or more).

- Innovation grants – financial assistance to businesses who wished to develop an agri-tech product or service with the potential agri-tech application.
- Graduate placements – a scheme to help place graduates within CIoS businesses, with a focus on roles that had an agri-tech focus.

In addition, the project planned to undertake a series of dissemination/knowledge exchange events to raise awareness of the research that was being undertaken through the ACP project.

The ERDF Call

ACP responded to an ERDF Call to deliver against Priority Axis One (Promoting Research and Innovation), Investment Priority 1b, of the England Programme. The objectives of this Investment Priority 1b are set out below:

- Promoting business investment in Research & Investment (R&I).
- Developing links and synergies between enterprises, research and development centres and the Higher Education sector, in particular promoting investment in product and service development, technology transfer, social innovation, eco-innovation, public service applications, demand stimulation, networking, clusters and open innovation through smart specialisation.
- Supporting technological and applied research, pilot lines, early product validation actions, advance manufacturing capabilities and first production, in particular in key enabling technologies and diffusion of general purpose technologies.

The Evaluation Brief

Summative Assessment – staged approach

The original Invitation to Quote (ITQ) for the Summative Assessment outlined a requirement for it to be undertaken in three stages:

Stage One – Initial Formative Evaluation

Stage Two – Mid-term Evaluation

Stage Three – Final Summative Assessment Report

The Formative Evaluation was completed in November 2018, with a Mid-Term evaluation completed in January 2019. However, in May 2019 the project submitted a Project Change Request (PCR) that, including other changes, requested that the project timetable be extended from the original end date of March 2020 to 30th June 2021. As such, the project decided that it would be useful to undertake a further 'light touch evaluation' to independently review whether the project was still on course to achieve its intended objectives and impacts. This was completed in August 2020. This work also included a review of the evolving agricultural policy and funding landscape - helping to inform the strategic review of the project in terms of direction once the ERDF funding period has been completed. This was developed alongside the other core evaluation activities.

This report now represents the final stage of the evaluation process – drawing through findings from the earlier interim evaluation stages, as well as further primary work in this final evaluation stage.

It is important to note that this final evaluation activity covers the latter programme that has largely coincided with the Covid-19 outbreak and associated restrictions. This has had an impact on project activities in the latter part of the programme – as discussed through this report.

Stage One – Formative Evaluation (November 18)

The overall approach to the evaluation was set out in the Initial Formative Evaluation, with the core focus in that stage on the development of an Evaluation Framework which has guided the subsequent evaluation stages. The framework covered:

- A review of the project logic model (ESIF-Form-1-011) for the ACP project;
- A review of the summative assessment plan (ESIF-Form-1-012);
- A statement of the evaluation objectives, key questions – including those set out in the ITQ - and evaluation scope;
- Details of research methods and approach to impact;
- A framework for data collection and reporting.

The focus in this formative stage was to develop an approach that suited the particular needs of the project as well as MHCLG requirements.

As part of the review on data collection and reporting, we worked with the project to develop some different approaches to capturing data as the project progressed. This principally focused on two specific areas:

- The development of a set of additional questions to be used at dissemination/knowledge exchange events that were planned. This covered delivery of events until Covid-19 began to impact on the ability of the project to hold such events – certainly in a physical sense.
- The development of a set of additional questions to be integrated into the 'post payment monitoring reports' for those businesses that received an innovation grant.

Stage Two – Interim Evaluation (February 2019)

This interim evaluation that took place during late 2018/early part of 2019 focused on the delivery aspects of the project. The following steps were undertaken in this phase of the work:

- Direct consultations with 12 individuals involved in the project. This included:
  - Each of the delivery partners (Duchy College, University of Exeter, Plymouth University or Rothamsted Research);
  - Cornwall College acting as the accountable body and lead organisation for the project;
  - Cornwall Development Company as the delivery partner and lead organisation for the innovation grants;
  - A selection of the members of the Strategic Steering Group, including its Chair.
- An online survey was circulated to 22 businesses who had been supported at that time – receiving 14 responses.
- Telephone interviews were held with 9 businesses to understand the businesses' perspective on how their involvement with the project is progressing.
- A review of the project documentation – including the original ERDF application, Grant Funding Agreement and Project Change Request – and monitoring information was undertaken. This included progress against contracted ERDF output targets, and financial expenditure.
- The emerging findings were discussed with the programme director and presented at the Strategic Steering Group in January 2019. Several key issues were highlighted for consideration and wider discussion. That discussion was reflected in the interim findings.

Stage Three – 2nd Interim Evaluation (August 2020)

Given the extension of the project it was felt there was a further opportunity to review project progress. Again, the following steps were undertaken in this phase of the work:

- Direct consultations with 11 individuals involved in the project, again revisiting discussions with the delivery partners and accountable body. We also interviewed a small selection of SSG members, including its Chair.
- Telephone interviews with a further 9 businesses who had supported. These were different businesses than interviewed for the initial interim evaluation.
- A further review of the project documentation – including the original ERDF application, Grant Funding Agreement and the further Project Change Request that was submitted in May 19. We also reviewed the project's monitoring information to understand progress against contracted ERDF output targets, and financial expenditure.
- An extensive review of policy developments that had – and were projected to – impact on agriculture. This was updated in January 2021. Some of these findings are reflected in this report.

Stage Four - Final Summative Assessment (May-September 2021)

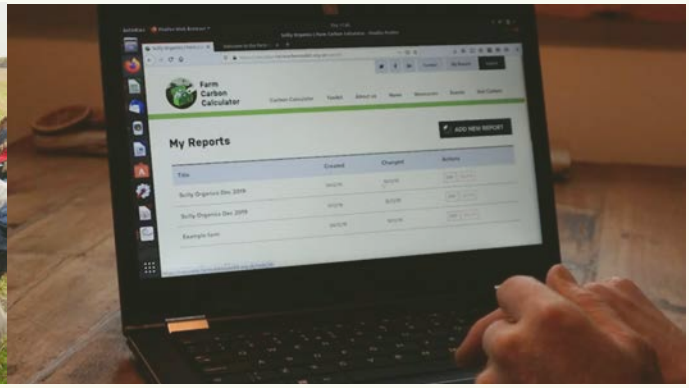
The final summative assessment took place over the summer 21. The following steps were undertaken in this phase of the work:

- An online survey was circulated to businesses supported through the three primary strands - receiving 27 responses
- Two online workshops were held with supported businesses. Each workshop involved 4 businesses - 8 in total
- Telephone interviews with held with a selection of individuals (6) who had been supported through the graduate placement scheme
- A further session was held with the SSG to get its updated view on the impact and role of the project - taking place in July 21
- Telephone interviews were held with some members of the delivery partnership - with a specific focus on Future Farm given its opening in the intervening period
- A review of updated output and financial performance data

FARM CARBON TOOLKIT

Farm Carbon Toolkit was an industry partner alongside the Duchy College, University of Plymouth, and Rothamstead Research through the ACP supported Soil Carbon research project.

Over the last 2 years, the Farm Carbon Toolkit has undergone significant growth as an organisation. While the organisation has existed for over 10 years, in the last 12 months, it's grown from one employee to eight. It expects to double its turnover in 21/22. It is now operating several projects with prominent, mainstream food and agriculture industry organisations, such as Yeo Valley, First Milk, Hutchinsons and the Duchy of Cornwall.



Its Farm Carbon Calculator continues to be well-regarded in the sector. According to a recent Farmers Weekly survey, it is the most popular carbon calculator for farmers. Alongside ongoing updates to ensure its scientifically robust and up to date, the business is making investments to introduce new features, to ensure it remains market leading.

Its recent growth has been driven by a combination of supportive funding through ACP, and continued research interaction and involvement with Duchy College's Rural Business School. This has enabled the business to further develop its products and services, responding to an increased interest from farmers, agri-business and landowners in farm and soil carbon. Its work links to the wider agenda to work towards net zero, and the increased recognition of the agriculture's role in achieving this.

https://farmcarbontoolkit.org.uk/

Farm Carbon Toolkit

This section responds to the Summative Assessment requirement around the continued relevance of the programme in the light of changes in policy or economic circumstance, commenting on the appropriateness of the programme design given its objectives.

Drivers for the Cornwall Agri-tech programme

The intervention logic model for the Cornwall Agri-Tech project is set out in the Summative Assessment Logic model (ESIF Form 1-1011). This summarised the context for the project, the market failure rationale for intervention, and the project objectives, rationale, inputs, activities outputs, outcomes and intended impacts.

The formative evaluation stage of this work reviewed the project logic model and amended it to better reflect the project's activities and intended outcomes.

CONTEXT

Cornwall has low levels of R&D spend, innovation, knowledge economy employment. Agri-tech provides opportunities for growth.

MARKET FAILURE ASSESSMENT - RATIONALE FOR INVESTMENT

Information failures - awareness of the benefits of RD&I.
Externalities - innovation spill-over effects lead to underinvestment in RD&I; Agri-tech R&D addresses major societal challenges with public good aspects.
Barriers to SMEs accessing finance for RD&I.
Barriers to collaborative working.

OVERALL OBJECTIVES

1. Increase investment in Agri-tech research and innovation by SMEs.
2. Increase the number of Agri-tech SMEs engaged in knowledge exchange and collaborative research and innovation.
3. Support Agri-tech SMEs to bring new products and processes to the market.
4. Demonstrate the benefits of working with knowledge-based partners to Agri-tech SMEs.

INPUTS

Partner salaries, overheads and other direct costs.
ERDF financial support for project activities.
SME salaries, overheads and financial contribution to project activities.

ACTIVITIES

1. Awareness raising sessions and co-creation workshops.
2. Innovation vouchers.
3. Graduate placements.
4. Collaborative RD&I projects.
5. Development of Dairy Systems Research Platform.

SPECIFIC OBJECTIVES

Raise awareness of RD&I opportunities, enhance confidence to engage, facilitate access to partners for collaboration.

Address barriers to finance, encourage increased RD&I through subsidy.

Enhance capacity and capability of businesses to engage in RD&I, facilitate collaboration with research partners, increase RD&I through subsidy.

Enhance investment in RD&I through public support, facilitate collaboration between SMEs and research partners.

Enhance investment in RD&I through strategic investment in infrastructure, facilitate collaboration between SMEs and research partners.

OUTPUTS

1. No of enterprises receiving support;
2. No of enterprises receiving grants;
3. No. of enterprises receiving non-financial support;
4. No. of new enterprises supported;
5. Private investment matching public support;
6. Employment increase in supported businesses;
7. Number of enterprises co-operating with research institutions;
8. Number of enterprises supported to introduce new to the firm products;
9. Number of enterprises supported to introduce new to the market products;
10. Public or commercial buildings built or renovated.

1st LEVEL OUTCOMES

Creating the conditions for RD&I

SME awareness of opportunities and benefits of RD&I;

SME confidence in engaging in RD&I;

SME access to finance to undertake RD&I;

SME awareness of RD&I capabilities of research partners and other businesses;

Research partners' knowledge of industry RD&I needs and capabilities;

Enhanced levels of collaboration and knowledge exchange between businesses and knowledge partner;

Enhanced RD&I infrastructure (e.g. dairy systems research platform).

2nd LEVEL OUTCOMES

Changing behaviour

SMEs actively engaged in RD&I activity;

SMEs engaged in development of new products;

SMEs engaged in development or improvement of processes;

SMEs engaged in collaborative R&D projects;

Number of staff engaged in RD&I activities;

RD&I spend among supported businesses;

Improved knowledge and dissemination of learning in priority themes.

3rd LEVEL OUTCOMES

Results from RD&I

New to firm products

New to market products

New processes introduced

Employment in supported businesses

Researchers in agritech industry

IMPACTS

Agri-tech sector RD&I spend;

Number of Agri-tech companies engaged in RD&I activity;

Agri-tech sector output;

Agri-tech sector employment;

Agri-tech sector GVA.

In terms of the original market failure that underpinned the justification for public investment, the project was designed to address a wide range of market failures, that included:

- Information failures related to awareness of the benefits of RD&I.
- Externalities leading to underinvestment in RD&I. Spill-over effects mean that individual firms tend to underinvest in RD&I and present a case for public subsidy. In addition, agri-tech RD&I is seeking to find solutions which address major societal challenges (such as sustainability, climate change mitigation, animal welfare, food security) which have major externalities.
- Barriers to SMEs accessing finance for RD&I.
- Barriers to collaborative working, which prevent businesses accessing the knowledge, skills and capabilities necessary to undertaken RD&I.

Our view – as defined in the formative evaluation - is that the project's five activities each had specific objectives that related to tackling the above market failures:

Activity	Specific Objectives
1. Knowledge exchange and dissemination	To raise awareness of RD&I opportunities, enhance confidence to engage, facilitate access to partners for collaboration.
2. Innovation grants	To address barriers to finance, encourage increased RD&I through subsidy.
3. Graduate placements	To enhance capacity and capability of businesses to engage in RD&I, facilitate collaboration with research partners, increase RD&I through subsidy.
4. Collaborative RD&I projects	To enhance investment in RD&I through public support, facilitate collaboration between SMEs and research partners.
5. Future Dairy Platform	To enhance investment in RD&I through strategic investment in infrastructure, facilitate collaboration between SMEs and research partners.

The ongoing economic and policy context

As previously stated, the interim evaluation that was undertaken in the Summer of 2020 included a comprehensive review of the policy landscape within agriculture. This fed into an online workshop in January 2021 that was facilitated by Ash Futures and included a range of stakeholders and members of the SSG. The focus of this workshop was an initial discussion regarding how future agri-tech related activities could be positioned to meet the evolving and dynamic agricultural economic and policy landscape – beyond the ERDF funded period.

A summary of that comprehensive review is contained below. Much of the developing economic and policy landscape has been shaped by two significant factors:

- The UK's decision to withdraw from the EU and the Common Agricultural Policy (CAP) as well as EU policies for the environment, regional development and innovation.
- The impact of Covid-19.

The continued relevance of support to help the development of innovation and capability within agri-tech, as well as future opportunities focused on:

1. The **policy developments and societal challenges** that agri-tech can help to address.
2. The **local economic development agenda**, and particularly the contribution of agri-tech to local industrial strategies.
3. The **future funding landscape for research and innovation** in the UK.

1. Policy developments and societal challenges

Agricultural Policy

The **Agriculture Bill** received royal assent in November 2020, becoming the **Agriculture Act 2020.** It sets out Government policy for agriculture after the UK's exit from the EU and the Common Agricultural Policy (CAP). Direct payments to farmers will be phased out over seven years from 2021, replaced by new schemes on the principle of public money for public goods.

Public goods are defined to include: managing land or water to protect/improve the environment and cultural heritage, mitigate/adapt to climate change and protect from natural hazards; promoting access to the countryside; protecting or improve animal health and welfare; conserving genetic resources and native breeds of plants and livestock; protecting or improving the quality of the soil; enhancing the productivity of agriculture/ horticulture/ forestry; and supporting ancillary activities (such as processing and marketing).

In November 2020, the Government published a Multi-Annual Financial Assistance Plan 2021-27 presenting plans for transitional support for the agriculture sector following EU exit. The strategic priorities for the use of the financial assistance powers follow Part 1 of the Agriculture Act 2020:

- Encourage increased sustainable productivity in the agricultural sector.
- Significantly contribute to meeting the goals set out in the 25 Year Environment Plan.
- Contribute to meeting the UK's net zero carbon emissions goal by 2050.
- Protecting and improving health and welfare of livestock.

Further details are set out in a document entitled **"Path to Sustainable Farming" (or Agricultural Transition Plan)** and include:

- Introducing the Environmental Land Management (ELM) scheme to incentivise sustainable farming practices, create habitats for nature recovery and establish new woodland to help tackle climate change.
- Investing in improving animal health and welfare as part of our sustainable farming approach. This will initially focus on controlling or eradicating endemic diseases amongst cattle, pigs and sheep.
- Direct Payments will be reduced fairly, starting from the 2021 Basic Payment Scheme year, with the money released being used to fund new grants and schemes to boost farmers' productivity and reward environmental improvements.
- Launching a Farming Investment Fund, which will support innovation and productivity. This will open for applications in 2021 and will be used to offer grants for equipment, technology and infrastructure for the future.

The new **ELM scheme** will have three components:

- Sustainable Farming Incentive, which will support approaches to farm husbandry that deliver for the environment, such as actions to improve soil health, hedgerows and integrated pest management.
- Local Nature Recovery, which will pay for actions such as creating, managing or restoring habitats, natural flood management and species management.
- Landscape Recovery, which will focus on landscape and ecosystem recovery through projects looking to achieve large-scale forest and woodland creation, peatland restoration, or the creation and restoration of coastal habitats, such as wetlands and salt marsh.

A new **Farming Investment Fund** is intended to be opened for applications in Autumn 2021. It will provide targeted support to businesses so that they can invest in equipment, technology, and infrastructure that will improve their productivity and deliver environmental and other public benefits. There will be 2 levels:

- Farming Equipment Technology Fund will offer small grants to contribute towards the purchase of a list of specified items.
- Farming Transformation Fund will provide larger grants towards the cost of more substantial investments in equipment, technology or infrastructure, with the potential to transform business performance.

From 2022, the UK Government has announced that farmers will also benefit from an increased investment in **agricultural Research & Development** that will enable more farmers and agri-food businesses to drive innovation. This will see farmer-led R&D projects to trial and demonstrate viability of new and existing technologies to address immediate on-farm productivity challenges as well as research into how agriculture can meet its longer-term goals to reduce greenhouse gas emissions and achieve net zero.

The **R&D scheme** is designed to provide a step change in agricultural productivity. It will support:

- Industry led research and development syndicates: Large-scale projects over a maximum of 4 years, where syndicates of farming and agri-food organisations across the supply chain work in partnership with scientists and researchers to develop technology and innovative solutions to shared productivity challenges that affect businesses.
- Themed collaborative research and development: Collaborative projects over 3 to 4 years, where farming and agri-food businesses work with scientists and researchers to carry out more fundamental research and development, focused on high priority strategic challenges – such as achieving Net Zero – with the potential to transform agricultural productivity in the long term.
- Accelerating Adoption: Smaller agile projects up to 2 years, to test the feasibility of new technology and demonstrate new methods to the farming community. These projects will be farmer-led and focused on finding practical solutions to immediate on-farm productivity challenges.

The UK Government has announced an intention that investment/ R&D/ other farm prosperity measures will account for c9% of the overall budget for agricultural support (£200m+).

The Government has announced that it will develop a **National Food Strategy** for England, the first for 75 years. The Strategy aims to ensure that England's food system delivers safe, healthy, affordable food; is robust in the face of future shocks; restores and enhances the natural environment; is built upon a resilient, sustainable and humane agriculture sector; contributes to economic development, employment and innovation; and is efficient and cost effective. The strategy will cover the entire food chain, from field to fork: the production, marketing, processing, sale and purchase of food (for consumption in the home and out of it), and the consumer practices, resources and institutions involved in these processes.

Covid-19 has had profound impacts on agriculture, as for other sectors, and is likely to have longer term implications for the sector's development. These implications include:

- Market disruption. The crisis has affected demand for agricultural output (especially for the food service and horticulture sectors) and caused disruption of supply chains.

- Economic uncertainty. The agriculture sector has called for the UK Government to delay the transition away from direct payments because of the uncertainty brought about by Covid-19.
- Food security. Covid-19 has increased attention on food security amid concerns about possible disruptions in food supply and supply chains.
- Labour supply. The crisis has heightened concerns about the availability of seasonal labour in the agricultural sector, as a result of restrictions on human movement.
- Economic recovery. The crisis will have a huge negative impact on the public finances, constraining future public expenditure and requiring new a strong business case to be made for future investment.

Brexit and Agricultural Trade

Early indications are that Brexit has had a fundamental impact on UK food and drink exporters. It has been estimated that UK food and drink exports to the EU almost halved in the first three months of the 2021, compared to the same period in 2021[1]. The EU accounts for the majority of the UK's trade in most agricultural commodities.

- The agricultural sector will be significantly influenced by future free trade agreements with non-EU countries. There are concerns that the UK could come under pressure to relax standards on meat and dairy products as part of agreements with the US, Australia and other countries, potentially increasing competition from cheap imports[2].
- These developments may be expected to have implications for the future of the agri-tech sector, but their effect is highly unpredictable and subject to future trade agreements and tariff related decisions.

The Climate Emergency

Cornwall Council declared a **climate emergency** in January 2019 and committed to work towards being carbon neutral by 2030[3]. In line with the requirements set out in the **Climate Change Act 2008** and as part of international obligations, the UK Government has now set in law the target to cut emissions by 78% by 2035 compared to 1990 levels. It has targeted becoming net zero by 2050[4].

Agriculture, which accounts for 10% of the UK's (and 20% of Cornwall's) emissions, has a major role to play, and it is widely accepted that meeting climate commitments will not be possible without major cuts in emissions in the sector[5]. However, progress has been slow, and a recent report by the UK Committee on Climate Change[6] found that current policies are inadequate to meet the UK's commitments. The report highlighted the role of R&D in boosting sustainable productivity and in informing the development of low carbon practices to reduce soil, livestock and manure management emission. The NFU produced a report to look at how agriculture could reach net zero by 2040.[7]

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[1] *https://www.bbc.co.uk/news/business-57518910*

[2] *https://www.bbc.co.uk/news/science-environment-57268681*

[3] *https://www.cornwall.gov.uk/environment/climate-emergency/our-action-plan/*

[4] *https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035*

[5] *Parliamentary Office of Science and Technology (2019) Climate Change and Agriculture*

[6] *UK CCC (2020) Land use: Policies for a Net Zero UK*

[7] *https://www.nfuonline.com/nfu-online/business/regulation/achieving-net-zero-farmings-2040-goal/*

The Environment and Natural Capital

Government policy is set out in the **25 Year Plan for the Environment**,[8] published in January 2018. Central to the Plan is the need to protect and enhance natural capital (air, water, soil and ecosystems) as an essential basis for economic growth and productivity over the long term.

Particular challenges with relevance for the agri-tech sector include:

- Achieving sustainable management of all of England's soils by 2030, using natural capital thinking to develop appropriate soil metrics and management approaches.
- Introducing new rules to tackle water pollution from farming (which now accounts for 25% phosphate, 50% nitrate and 75% sediment loadings in water).
- Improving the management and limiting the inputs of fertilisers, slurries and manures. This will raise particular challenges for the dairy sector.
- Reducing the environmental impact of pesticides.
- Cutting greenhouse gas emissions from the agriculture and land management sectors.
- Expanding the use of natural flood management solutions.
- Managing and reducing the impact of plant and animal diseases and tackling invasive non-native species.
- Connecting people to the countryside, with a wellbeing benefit.
- Increasing biodiversity.

Implications for Agri-tech:

In our view, the above developments have had important implications for the development of agri-tech capability and application within agriculture:

- **Increasing demand for technologies that enhance the environment and animal welfare.** There will be increased demand and funding for farming and forestry practices that enhance the environment and animal welfare (i.e. soil and water management, pollution prevention, waste management, climate change mitigation and adaptation, biodiversity and landscape conservation, protection of genetic resources, animal health and welfare etc.).
- **A need for farming practices that reduce carbon emissions,** through better management of soil, livestock, manures and fertilisers, and growth in bio-energy, forestry and agro-forestry, as well as sustainable growth in production to reduce agricultural land use, reduce deforestation and enable the expansion of carbon sinks.
- **New opportunities in monitoring technologies and techniques.** New payment mechanisms will be designed to encourage practices that enhance environmental and animal welfare outcomes, and reward innovation. This could increase demand for agri-tech innovations which enhance environmental outcomes (e.g. by increasing indicators to which payments are linked – e.g. plant diversity, soil quality, animal health). It could also stimulate demand for innovations in monitoring (e.g. remote sensing, soil testing, web-based recording, new techniques for monitoring animal welfare) as practicable and cost-effective methods will be needed to monitor results and verify eligibility for payments.

[8] *https://www.gov.uk/government/publications/25-year-environment-plan*

- **Increasing demand for sustainable growth and diversification of food production.** Greater concern about food security will drive demand for increased domestic production and the shortening and simplification of supply chains. This in turn will increase demand for new products and the substitution of imports with domestically grown goods. Covid-19 has led to growth in demand for vegetables and meat sourced directly from domestic suppliers, potentially stimulating new opportunities for local producers. Cornwall, with its mild climate and extended growing season, will be well placed to benefit.
- **Increasing demand for automation and labour-saving technologies.** Brexit and the Covid-19 crisis have highlighted concerns regarding shortages in low cost seasonal labour and the effect of reduced migration on the agricultural labour supply. This will further drive demand for automation and labour-saving technologies.
- **A greater focus on protecting and enhancing natural capital.** Implementing the natural capital approach will focus attention on technologies for improving the management of soil, water and nutrients and mitigating climate change. There will be particular challenges for the dairy sector, given the difficulty in maintaining profitability while achieving natural capital outcomes.
- **Economic diversification.** Agriculture has been less badly affected than many other sectors because of it offers a safer working environment, as well as meeting essential human needs. Future economic strategy may bring greater interest in opportunities for growth and innovation in the sector.
- **New financial instruments** (not subsidies or public payment for eco-systems services) continue to develop. FinTech continues to leverage green private sector investment.

2. Local economic development agenda

The draft Cornwall and the Isles of Scilly Local Industrial Strategy[9] was published in March 2020 and sets out Cornwall's vision and economic priorities for the next 10 years. The vision is that, by 2030, CIoS will have a creative and carbon-neutral economy realising opportunities for its people, communities and businesses to thrive, benefiting the environment and providing an outstanding quality of life for all. The agri-food sector is identified as one of five distinctive areas of opportunity. Agriculture accounts for 20% of CIoS carbon emissions, making-low carbon food production and natural capital enhancement local priorities.

Recognising their common interests, the three LEP areas of Cornwall and the Isles of Scilly, Heart of the South West and Dorset have come together to form the **Great South West.** The Great South West prospectus[10] was published in January 2020. It sets out a vision for a clean, smart and connected green economy, developing carbon sinks, investing in natural capital, achieving net zero emissions in food and farming, driving environmental innovation and investing in agri-tech.

Details are still yet to emerge about the value and design of the **UK Shared Prosperity Fund** (UKSPF), which will be the primary national fund for regional development, aiming to reduce inequalities between communities across the four nations of the UK after exit from the European Union and its Structural Funds[11]. It will aim to do so by raising productivity, especially in places where it is below the UK average, by strengthening the foundations of productivity.

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[9] *https://cioslep.com/case-study/local-industry-strategy/*

[10] *https://greatsouthwest.co.uk/20200108-GSW-Prospectus-final-.pdf*

[11] *MHCLG (2018) Local Growth: Written statement - HCWS927. 24 July 2018.*

Implications for Agri-tech

In our view, the above developments have had important implications for the development of agri-tech capability and application within agriculture:

- Alignment with priorities set out in national and local industrial strategies will be vital for future funding from the UK Shared Prosperity Fund and other sources.
- The draft Cornwall LIS and prospectus for the Great South West provide a strong justification for investment in agri-tech as a means of building on local strengths, enhancing productivity and innovation in a key sector, and contributing to net zero and sustainability ambitions.
- Agriculture accounts for a large share of greenhouse gas emissions in CIoS, emphasising the urgent importance for the net zero ambition of achieving progress in the sector. There is therefore a need and opportunity for CIoS to position itself as a leader in this field.
- Other opportunities linked to agri-tech, such as enhancing natural capital, developing the technology needed to support the new environmental land management agenda, and strengthening links with the visitor economy, also align well with this agenda.
- CIoS is well positioned to play a leading role across the wider region. Maximising the opportunities will depend on understanding the differences in agricultural systems and issues across the region and forming wider collaborations with knowledge institutions, businesses and farms across the wider South West.

3. Research and Innovation Funding:

The UK Government has an ambition for the UK to become the most innovative country in the world and increase its total R&D expenditure to 2.4% of GDP by 2027. **UK Research and Innovation** (UKRI) has been established to co-ordinate this effort. UKRI works across the UK, bringing together the work of the seven research councils, Innovate UK and Research England, and has a combined budget of more than £7 billion over 3 years.

UKRI administers a number of funding programmes which have relevance to agri-tech, including the **Strength in Places Fund (SIPF),** the **Industrial Strategy Challenge Fund (ISCF)** and the **Transforming Food Production Challenge (TFPC).** In terms of the latter, funding of up to £90mn will help businesses, researchers and industry to transform food production and move towards net zero emissions by 2040. The challenge aims to build on the UK's global leadership in environmental management and earth observation, sensors, big data, artificial intelligence and robotics.

The UK Government has announced that the UK will associate to **Horizon Europe**, the EU research and innovation programme that will run from 2021 to 2027. Association will give UK scientists, researchers and businesses access to funding under the programme on equivalent terms as organisations in EU countries. Food, Bioeconomy, Natural Resources, Agriculture and the Environment is one of six societal challenges that will be prioritised for funding.

Implications for Agri-tech Cornwall

In our view, the above developments have had important implications for the development of agri-tech capability and application within agriculture:

- Research and innovation will continue to provide strong opportunities for public funding in line with the UK's overall R&D target.
- Agri-tech has risen in prominence in the UK research and innovation agenda in recent years, with growing sustainable food production now recognised as a major societal challenge and area of UK strength.
- Given the lack of clarity over the Shared Prosperity Fund, it is not clear how much prominence will be given to supporting agri-tech related activity within that local/ regional funding programme.
- The Strength in Places Fund, Industrial Society Challenge fund and UKRI research councils (especially BBSRC and NERC) provide future opportunities for R&I funding in Cornwall.
- Horizon Europe may provide a future source of funding for agri-tech projects involving collaboration with EU partners.

Conclusion

This section draws a conclusion in relation to the overall Summative Assessment question of the continued relevance of the programme in the light of changes in policy or economic circumstances. We have set out our conclusions for each section on the basis of RAG ratings. For this section, the key should be read as:

red = no longer relevant amber = adequate relevance green = strong relevant

SA evaluation question	Comment
Continued relevance of the project. **Bearing in mind any context changes or project design weaknesses can the project reasonably be expected to perform well against targets**	In our view the recent economic and policy changes relating to agricultural, food security and landscape management has strengthened the justification for activities that support the use of technology within agriculture. The UK's decision to withdraw from the EU – and specifically the EU's Common Agricultural Policy – has led to subsequent policy decisions by the UK Government to focus on subsidy payments shifting from food production to payment for public goods e.g. such as the proposed ELM payment structure. Sitting alongside this there is an increased emphasis of leveraging additional R&D into agriculture and land management. This aligns closely with the objectives of the Agri-tech Cornwall. National programmes such as Transforming Food Production clearly have close links with the aims of this programme. Locally, there is a clear focus on 'clean and green' within Cornwall and its own ambitions for net zero. Given that agriculture is one of the major emitters across Cornwall, then Agri-tech Cornwall's increasing focus on reducing carbon emissions and/or improving natural capital again have close alignment. Overall, there have been no changes to question the continued relevance of the project and, indeed, justification for this type of activity has been strengthened.

FIELDWORK ROBOTICS

Fieldwork Robotics (https://fieldworkrobotics.com/) was an industry partner alongside the University of Plymouth through the ACP supported Robotic Harvesting research project. Since its involvement with ACP, Fieldwork Robotics has gone on to raise a significant amount of private equity investment. This has enabled the business to accelerate its scale up of its raspberry harvesting robot to bring it to market and embark on the further development of the cauliflower-harvesting robot in collaboration with Bonduelle - one of the world's largest vegetable producers.

An alpha prototype of the raspberry harvester has now entered further field trials. Fieldwork Robotics will then focus on preparing the robot design for manufacture.

The technology's potential has been recognised by Innovate UK, which awarded a substantial Industrial Strategy Challenge Fund grant to accelerate development of its technology with the National Physical Laboratory. Other support has been received to support the cost reduction of specific components. Fieldwork Robotics s has been featured in several national and international robotics journals and has appeared in numerous press articles *(https://www.theguardian.com/business/2020/sep/21/robots-gear-up-to-march-to-the-fields-and-harvest-cauliflowers).*

(https://fieldworkrobotics.com/)

Fieldwork
ROBOTICS

This section reviews outputs and spend against targets. It also reviews the Project Change Requests (PCRs) and their impact on budget, spend profiles and output targets.

Project Change Requests

The project has now submitted three separate Project Change Requests (PCR). Each PCR was submitted due to different reasons and various issues that have arisen during the project, including changes in the external environment (principally the impact of Covid-19 in the latter stages of the project period). Each separate PCR is summarised below:

- **PCR 1 (submitted April 2018)** – To reflect a later than planned for start date there was a request to shift the practical completion and financial completion dates back by three months, with a practical completion date of the 30th June 2020 approved. Alongside this, due to a slippage in start date the total value of the project was adjusted from £10,213,587 to £9,529,993. The approved ERDF funding reduced from £7,689,702 to £7,167,841. Both public and private match funding were reduced. There was no change to the agreed ERDF output targets.
- **PCR 2 (submitted May 2019)** – the project submitted a further PCR which contained the following elements:
  - Extension of the project delivery period from to 30th June 2021, with financial and practical completion date by 30th September 2021. Effectively this represented a 15-month extension.
  - Increase of total project value from £9,529,993 to £11,845,908 – representing £9,794,995 of revenue and £2,050,913 of capital. This budget increase required an additional £1,756,368 of ERDF support – totalling £8,924,214.
  - Within this, the total budget available for the innovation grants increased by £365,824 to £1,324,508. The PCR also reflected the request to effectively increase the average size of grant from £14,200 to between £20,000-£22,000 – reflecting the demand for larger grants that had materialised at the start of the programme. Alongside this, smaller proof of concept grants were made available.
  - Increasing the budget available for graduate placements by £84,913 to £501,308 – reflecting higher than envisaged demand at the time.
  - Enable Future Farm to be completed and allow 12 months of associated R&D activity.
- **PCR 3 (submitted May 2021)** – this was a request to extend the project to 31st December, making use of underspend (principally due to the impact of Covid-19 on activities) to provide more business support and enable:
  - 12 months of RD&I enabled through the Future Farm platform.
  - Supported enterprises to have sufficient time to complete their Innovation Grant and Graduate Placement projects.
  - The project to continue assisting in the Covid-19 recovery and the post-Brexit transition.

There was an increase in some of the outputs (as shown in the table below) to reflect the longer delivery period, although some outputs were reduced – principally those relating to financial support (innovation grants and graduate placements). There was an associated reduction in the target for leveraged private investment, given that both innovation grants and graduate placements required private matched funding.

As the extension is now utilising project underspend it is not possible to fund all delivery partner activities. Consequently, the research activities for the universities of Plymouth and Exeter, as well as Rothamsted Research came to an end in June 2021. Therefore, delivery partners for the remainder of the project are:

- Innovation Grants (Cornwall Development Company)
- Graduate Placements (Cornwall College, Unlocking Potential)
- Research at Future Farm (Cornwall College, Duchy College)
- Core project management (Cornwall College)

	Original (and PCR 1) **output targets**	**PCR 2 output targets** (change from original output target)	**PCR 3 output targets** (change from original target)
C1 enterprises receiving support	80	99 (+19)	108 (+28)
C2 enterprises receiving grants	53	58 (+5)	44 (-9)
C4 enterprises receiving non-financial support	50	68 (+18)	87 (+37)
C5 new enterprises supported	7	9 (+2)	23 (+16)
C6 private investment matching public support to enterprises (grants)	£309,950	£506,590 (+ £196,640)	£487,354 (+ £177,404)
C8 employment increase in supported enterprises	10	12 (+2)	19 (+7)
C26 enterprises cooperating with research institutions	40	74 (+34)	91 (+51)
C28 enterprises supported to introduce new to the market products	8	10	25 (+17)
C29 enterprises supported to introduce new to the firm products	25	31	36 (+9)
P2 public or commercial buildings built or renovated	1	1	1 (-)

The increase in output delivery - not accompanied by an increase in funding - represents an increase in value-for-money in terms of 'cost per output' delivery (see later analysis).

Output assessment

This subsection reflects on the output targets for Cornwall Agri-tech. It is based on the data taken from the Claim 17 (to end of June 2021) as well as review of programme information and discussion with team members. We have also reviewed performance – in terms of achievement against profile – over the programme period.

There are 10 ERDF outputs against which the project is required to report. Each of these is discussed in turn. As ACP is undertaking activities which cut across different strands of Priority Axis 4 (discussed in Section 2), outputs are also drawn from these different strands and identified as such in quarterly reports.

- C1: number of enterprises receiving support
- C2: number of enterprises receiving grants
- C4: number of enterprises receiving non-financial support
- C5: number of new enterprises supported
- C6: private investment matching public support to enterprises (grants)
- C8: employment increase in supported enterprises
- C26: number of enterprises cooperating with research institutions
- C28: number of enterprises supported to introduce new to market products
- C29: number of enterprises supported to produce new to the firm products

- P2: public or commercial buildings built or renovated

The following table summarises progress on ERDF outputs, using the SA report template format. The RAG rating reflects that adopted by MHCLG when reviewing output performance against target, with a threshold of 85% of target set out. It is important to note that a second Project Change Request (PCR2) was approved by MHCLG in May 2021. This is discussed in more detail elsewhere in this report but the includes revised targets for a number of ERDF outputs – reflecting the extension in the delivery period for the programme (December 21).

Table 1 now sets out achievement (outputs claimed) against the revised output targets as set out in the PCR approved in May 2021.

Output indicators	Original (and PCR1) Funding Agreement	As amended/ confirmed in PCR3	Total achieved as at June 21	% of target	Projected to be achieved by end of project	% of target (PCR3)
C1 enterprises receiving support	80	108	102	94%	108	100%
C2 enterprises receiving grants	53	44	38	86%	44	100%
C4 enterprises receiving non-financial support	50	87	86	99%	87	100%
C5 new enterprises supported	7	23	24	104%	24	104%
C6 private investment matching public support to enterprises (grants)	£309,950	£487,354	£455,085	93%	£487,354	100%
C8 employment increase in supported enterprises	10	19	17	89%	19	100%
C26 enterprises cooperating with research institutions	40	91	95	104%	91	100%
C28 enterprises supported to introduce new to the market products	8	25	21	84%	25	100%
C29 enterprises supported to introduce new to the firm products	25	36	32	89%	36	100%
P2 public or commercial buildings built or renovated	1	1	1	100%	1	100%

Key less than 85% between 85% and 95% Greater than 95%

As previously stated, the delivery of the C2 output (enterprises receiving support) and C6 (private matched investment) encapsulates the innovation grant and graduate placement elements of the project – given they both involve direct financial support to businesses, and a requirement of matched investment by that business. The indicative breakdown of each output is shown below in Table 2:

Table 2: Innovation Grant and Graduate Placement output performance

June 2021								
	C2 output target (PCR3)	C2 output achieved to date	C2 Outputs remaining	% C2 output target remaining	C6 output target	C6 output achieved to date	C6 output remaining	% C6 output target remaining
Total	44	38	6	c14%	£487,354	£455,085	£32,269	6.6%
Innovation Grant		27	n/a	n/a		£217,318		
Graduate Placement		11				£237,770		

As shown, we have assigned a RAG status to each of the output targets as it stands. Whilst it is clear the project has continued to deliver against its ERDF targets for some output targets the impact of Covid-19 significantly affected project delivery from Q2 2020 onwards. As such the RAG rating reflects this increased uncertainty/risk, particularly as the project completion date nears. The expectation that some of the output targets that had been previously set out as a result of PCR2 would not be met, resulted in a revision of those output targets in PCR3. The approval of those revised output targets now means that there is greater confidence they will be met by the end of December 21.

There are several observations on the performance against the output target/profile:

- The number of C1 outputs (businesses receiving either financial or non-financial support) is slightly behind profile. However, the approved PCR in May 2021 has increased the C1 output target, and it is assumed that the project has confidence that this higher target will be achieved through the project extension.
- As indicated in the previous interim evaluation (2020), Covid-19 has particularly impacted the delivery of C2 outputs – the provision of financial support. This has impacted both the targeted number of innovation grants and graduate placements. As the table above shows, as of June 21 both elements were behind the expected profile – albeit this has narrowed as a consequence of the reprofiled targets through PCR3. However, there is an expectation that the number of claimed innovation grants would increase as more businesses were able to provide evidence of defrayed expenditure. Nevertheless, the approved PCR3 has reduced the C2 output target to 44 to reflect some of the ongoing issues. The original target for the number of businesses receiving a graduate placement will not meet the levels expected.
- Overall, in terms of innovation grants, demand for grants has held up well. The difficulty has been that businesses have taken time to defray expenditure and provide necessary evidence. The project extension will allow this defrayal of expenditure and the number of C2 outputs should increase. In addition, as the overall project has drawn to a close, some CDC staff have moved into different posts and the resources available to deliver this strand has reduced.

- The project has consistently exceeded the C4 target for non-financial support (primarily associated with research project activities and evidenced by 12 or more hours of support)[12]. Consequently, the output target for C4 was increased and approved in PCR3 – with the number of enterprises expected to be supported significantly higher than the targets as set out in the original Grant Funding Agreement.
- The project has significantly exceeded the C5 target for support to new enterprises, with 24 start-ups supported to date. This reflects findings discussed elsewhere in this report i.e. highlighted in the online survey responses, that it appears that many of the businesses supported through the project have been at a relatively early stage of their commercial journey (with several pre-revenue).
- Following on from the previous observations, there has been pressure on evidencing against the C6 target for match funding with defrayal of expenditure associated with innovation grants and graduate placements. It was realistic to expect that the expectations around the level of private sector leverage would not be met. This was reflected in the downward revision of that target in PCR3, which now appears more achievable.
- The project has done well in delivering against the C8 target for employment increase. This partly reflects the graduate placements that are now in place i.e. in permanent employment. It does reflect some employment creation in other supported businesses. The primary work undertaken for this evaluation also indicates that the project has had a job impact. Whilst this has not necessarily been of a significant scale, there is evidence that some new jobs have been created through the support provided.
- The project continues to need to evidence new-to-market products and new-to firm products, although there is increasing confidence that the outturn on these measures will be strong – as reflected in the increase in output target for both C28 and C29 in the latest PCR3. In particular, the project has worked hard in evidencing new product development over the last few quarters, as evidenced by the increase in outputs claimed. A good proportion of the remaining outputs to be achieved will be delivered through the remaining innovation grant projects that are to be completed. In particular, the project has worked hard in evidencing new product development over the last few quarters, as evidenced by the increase in outputs claimed (as shown in Annex 3)
- The project has continued to perform strongly against the C26 target for businesses cooperating with research institutions – achieving 95 against a revised target of 91 therefore exceeding the output target. Again, the project extension has provided the capacity for this to increase – increasing significantly from the original output target of 40. We feel it should be recognised that this represents a good volume of SME's that have worked alongside the research partners over the course of the project.
- The build completion of the Future Farm platform is now reflected in the achievement against the P2 output target.

Overall, our independent review is that performance against the range of overall output targets has been robust. The output targets which have/had the greatest risk of not achieving the ongoing targets have clearly related to the 'financial support elements' e.g. innovation grants and graduate placements. On both counts, the disruption caused by the last 18 months of Covid-19 restrictions cannot be underestimated. For example, clearly, it has not been a priority for

[12] *It is important to note that the output targets for C2 and C4 do not exactly equate to C1 (even though both are subsets). This is because some businesses have received both non-financial and financial (innovation grants) support (therefore an overlap) but can only be counted once as a C1 enterprise support output.*

businesses to take on graduate placements at a time of great uncertainty. For both innovation grants and graduate placements, the delivery organisations (CDC and Unlocking Potential) felt that good momentum had been built and was effectively stopped by the onset of the pandemic.

Overall, the main risks throughout this evaluation process (as reflected in the previous interim evaluations and in the above RAG ratings) have tended to relate to the C1, C2, C6 and C29 outputs. However, given that the output targets have been again revised in the latest PCR3, each now have their own 'dynamic' because of these revised targets. Clearly, for some – such as C1 – there is confidence that output delivery will continue, and this has been reflected in an upward revised output target. For others – principally C2 and C6 – the latest downward revision in the output target largely reflects the expectation that delivery will be below previous expectations.

However, it is useful to note that when set against the output targets as reflected in the original Grant Funding Agreement (albeit this was based on a lower project cost and ERDF contribution) output delivery – apart from C2 - has significantly exceeded those original targets.

The separate project 'strands' are considered in turn.

Collaborative research projects

At the end of June 2021, 22[13] collaborative research projects have been approved, with all having commenced by October 2020. 21 (as of June 21) have been completed. In total, the projects had directly engaged with 84 eligible SMEs and will have research relationships with approximately 68 CIoS Annex 1 businesses or larger non-CIOS businesses (ineligible for direct support). In terms of the latter, the majority (52) have been provided through the Soil Carbon project. The progress and impact of collaborative research projects is discussed in more detail later in this report.

Graduate Placements

The graduate placement element of the project provides a small amount of financial support to the business taking on the Unlocking Potential – subsidising salary for a 9-month placement. It can provide a salary subsidy of £2,250 across the placement, as well as subsidised job advertising and professional mentoring from industry experts. There is a small budget to access the mentoring support – which includes communication and branding, technical, HR and financial support.

This element of the project had continued to develop well over the course of the project period until the significant disruption caused by Covid-19. Unlocking Potential has acted as the lead delivery partner for this element of the project. It is experienced in this activity, also providing a similar brokerage role to other sector-focused ERDF funded projects such as Marine-i. It uses its network to advertise opportunities and provides an initial assessment of candidates. It also performs due diligence on the applying business – with a focus on affordability i.e. that it has sufficient resources to pay for the placement and beyond.

The feedback from the consultation with the delivery partner has been positive in terms of its role within the wider project structure. It has allowed Unlocking Potential to break into the agri-tech sector and it feels it offers significant future potential as an employment destination for graduates with relevant skills and interest. It has been happy with the governance/management structure. For example, citing the quick turnaround of placement approvals (< 1 week). It also feels that the R&D focus of the project has been important, meaning that the graduate placement opportunities have been high quality. This has been confirmed through consultations with a sample of individuals who have benefited from the graduate placement scheme (see comment elsewhere).

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[13] This does now include the Duchy College led Natural Capital initiative which was not solely funded through the project. It also doesn't include the Covid-19 supply chain project which was a bespoke response and not necessarily regarded as a collaborative research project. There is also some overlap between the Dairy Cow Health and Welfare project and the Passive Cooling project.

This is partly reflected in the average salaries of those graduate placements (as reflected in the interim evaluation) – as shown in the diagram below, compared to other projects Unlocking Potential delivers within CIoS.

At the end of June 21, 19 nine-month placements have been approved for 16 SMEs. Of these, 15 graduate placements had been completed, with a further 4 being active. To date (end of June 21), c£237,700 matched funding had been provided by those businesses who had received a graduate placement. As shown in the previous table, the total target (as defined in PCR3) for C2 outputs was for 20 graduate placements. However, it is important to note:

- that a C2 output can only be claimed once for a business. Therefore, if a business had previously claimed an innovation grant, a subsequent graduate placement could not be counted as a further C2 output.
- that a business that has hosted more than one graduate placement can only be counted once as a C2 output.
- again, a business can only counted as a C2 output once it has defrayed expenditure i.e. drawn down the grant subsidy to support the graduate position.

Therefore, even though 16 businesses have received a graduate placement, five businesses could not be counted because they had previously received an innovation grant and cannot be counted as a C2 output twice. In that sense, the ERDF output understates the extent of graduate placement activity to date.

Through our consultations with a sample of graduate placements, it is clear that many of these posts have continued after the initial placement period. Many were offered permanent positions. Certainly, there is an expectation that a good majority of the 19 jobs targeted will reflect those ongoing graduate placements. We have interviewed some businesses where those original placements have already turned into permanent jobs.

The value of the graduate placement element of the project being delivered by Unlocking Potential can be demonstrated by the fact that through its own networks it has generated two-thirds of the leads for placements. The value of being linked into the project is equally demonstrated by one-third of placements coming from referrals by project partners.

We have spoken with some businesses who have received a graduate placement, as well as a sample of graduate placements themselves. The feedback – from both the perspective of the business and the graduate - in terms of engagement with Unlocking Potential has been positive – with all commenting on the helpful support provided by the UP team. All businesses have felt that the graduate placement has had a positive (commercial) impact on their business, although it is difficult to specifically attribute impact to the placement. However, given most hosting businesses are relatively small, the potential for those placements to be a central part of the future growth aspirations is high. Whilst some of the roles/placements have not necessarily always been 'agri'

focused, some are undertaking important business development roles (i.e. marketing, brand development etc.) for businesses within, or moving into, the agri-tech/agri-food.

Certainly, this was an element of the project that has been adversely affected by Covid-19. Understandably, many businesses froze recruitment during much of 2020. The output target remained stretching (as reflected above) and this was recognised through a downward revision of the output target in the approved PCR3. Before the pandemic, the delivery partner was confident that it was broadly on target to exceed c20 placements. It is important to reiterate the above point - that it has actually achieved 19 placements to date but only been able to 'count' 11 as an ERDF output. In our view, it is important to highlight that output 'quirk'.

The feedback from those graduates that we spoke to highlighted the value of the programme in allowing them to pursue a career in agricultural and agri-tech related activities. They indicated that the programme played an important role, principally in two ways:

- because the majority were now employed by micro and/or small businesses and the small financial assistance provided through the programme often played an important (if not necessarily fundamental) role. The time-limited placement programme also allowed both parties – the business and the graduate – to assess whether there was mutual benefit in extending the relationship into a permanent role. In effect, it reduced the risk to the business.
- by communicating/highlighting the opportunities as they arose, primarily through Unlocking Potential's communication routes. In that sense, utilising UP's existing 'reach' had worked well for the programme – allowing relevant opportunities to be advertised to prospective candidates.

Innovation Grants

At the time of the evaluation (June 2021), in total 34 innovation grant projects have now been approved or are at full application stage. 30 of these have either defrayed on either their first or second claim, with 4 being appraised or at offer letter stage. The extension to the project period to December 2021 will allow more innovation grants to be completed – one of the principal justifications for the extended project period. Thus far, the 30 supported businesses generated c£217,300 of private match funding. However, only 27 have been counted as a C2 output by June 2021. In a similar vein to that noted above, some businesses hosted a graduate placement first which meant that those businesses could only be counted as a C2 output once.

As referenced in the previous interim evaluations, it has tended to take longer than anticipated for grant subsidies to defray. Through 2019/20 additional resources in the CDC team helped in supporting businesses at the 'back-end' of projects, including evidencing of expenditure. This additional resource is now not in place, with only member of staff remaining to manage the remainder of the innovation grant programme out. This has in fact placed reasonable pressure on processing applications and ensuring that expenditure is defrayed and spent over the last 6-8 months.

As reflected in the below section (3.3), at the end of June 2021, c87% of the allocated budget for innovation grants had been defrayed by eligible businesses, although this differed dependent on capital or revenue grants. c88% of the allocation for revenue grants had been spent, whilst 95% of the capital grant allocation had been spent. Approximately £531,000 of the £558,000 allocated to Cornwall Development Company for the management of the scheme had been spent (June 2021). We feel that it useful to highlight that it appears that the cost of managing the innovation grant element of the project appears to have been relatively resource intensive. To date (June

2021), management costs equated to c44% of total spend (encapsulating direct grant payments and scheme management costs).

Financial Assessment

The revised budget for the ACP is set out in the table below, reflecting the overall changes to the project budget and the ERDF funding. The current project has a total project cost of £11,845,908, with an ERDF contribution of £8,924,214.

Table 4: Overall financial profile of ACP

	Total Project Value	ERDF funding
Original Grant Funding Agreement (2017)	£10,213,587	£7,689,702
Project Change Request 1 (2018)	£9,529,993	£7,167,841
Project Change Request 2 (2019)	£11,845,908	£8,924,214
Project Change Request 3 (2021)	£11,845,908	£8,924,214

Total Project

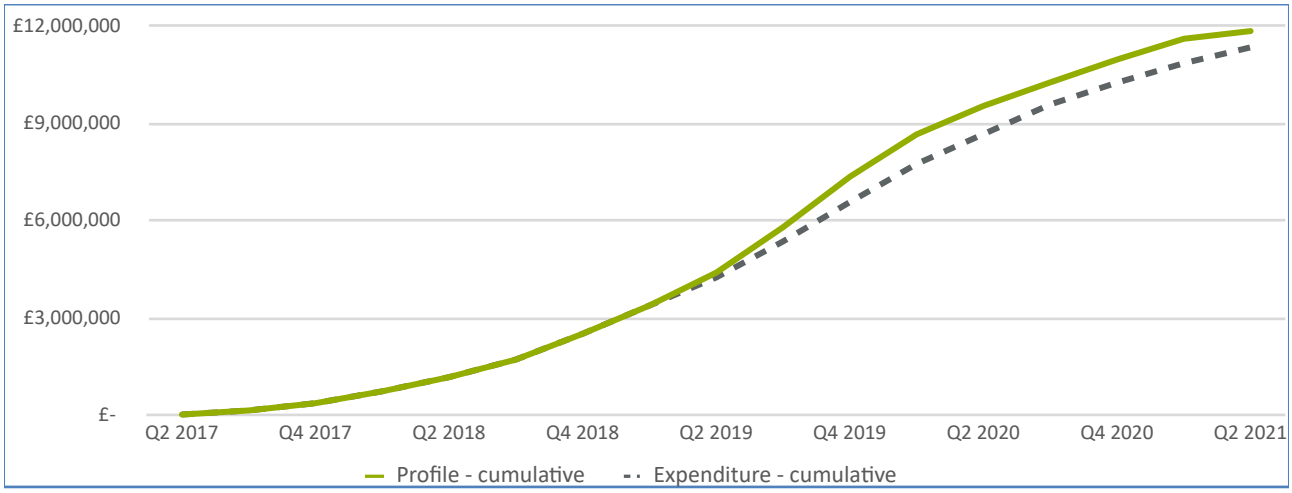
As of June 2021, the target for total project expenditure was £11,845,908. The project had spent an estimated £11,344,002, resulting in a £501,906 underspend against the revised profile (as reflected in PCR2) – equivalent to a 4.2% underspend against profile.

However, the cumulative underspend that had increased at the end of 2019/early 2020 has narrowed, even though spend has reduced as the Future Farm platform was completed – and most of the capital expenditure had been drawn down.

The below chart shows that from the middle of 2019, the project has experienced an underspend against profile (PCR2). This has principally been due to two factors:

- The construction of the Future Farm platform running behind schedule, which meant that capital expenditure lagged intended profile (as shown in subsequent chart) – in the latter stages of construction this was accentuated by Covid-19.
- The impact of Covid-19 also impacting upon the other elements of the project – research collaborations, innovation grants and graduate placements. Delivery was affected in various ways for each strand.

Chart 1: Total Project Expenditure against revised (PCR2) profile



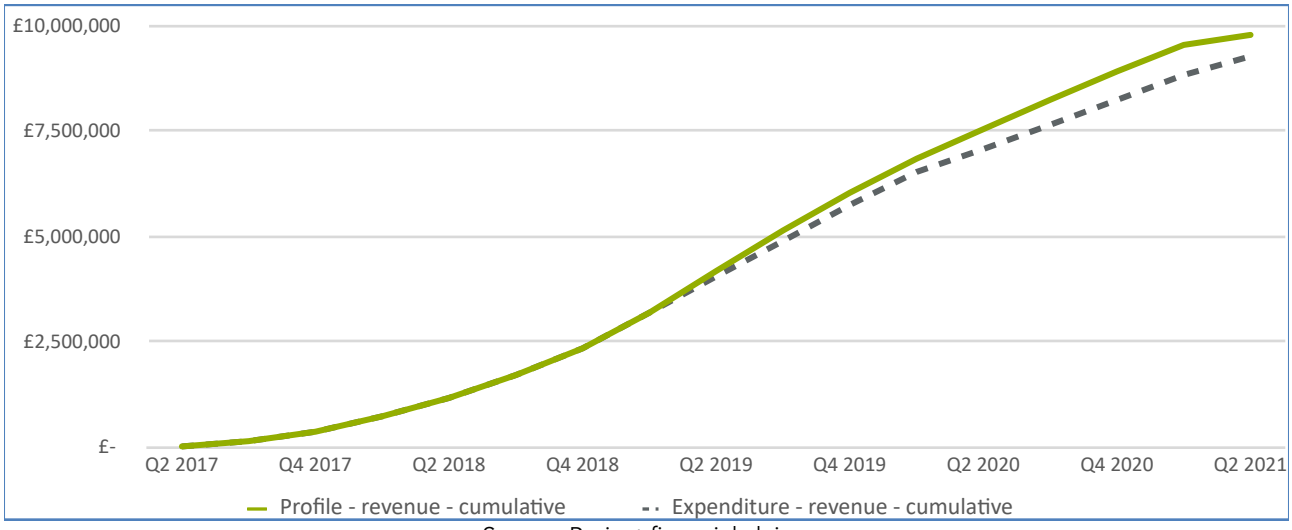
Source: Project financial claims

Revenue:

As of June 2021, the target for total revenue expenditure was £9,794,995. The project had spent an estimated £9,286,845, resulting in a £508,150 underspend against the expenditure profile that had been revised through PCR2 – equivalent to a 5.2% underspend against profile. However, the changes approved in PCR3 have effectively recognised the potential to pull forward some of that underspend over a longer delivery period.

As the above chart shows, the cumulative revenue underspend had increased steadily through from the latter part of 2019 and through 2020/21 as the impact of Covid-19 on research activities within the delivery partners became more marked. Revenue underspend represents c95% of total project underspend – as shown in the below Chart 2.

Chart 2: Revenue expenditure against revised (PCR2) profile



Source: Project financial claims

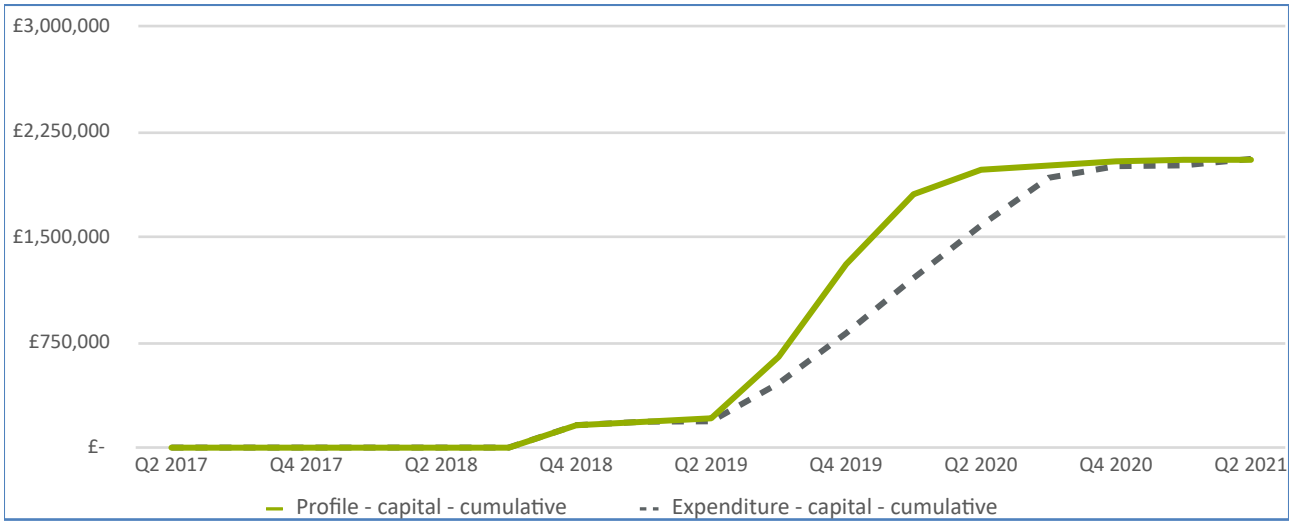
Capital:

As of June 2021, the target for total capital expenditure was £2,050,913. The project had spent an estimated £2,057,157, resulting in a slight overspend of £6,244 against the revised profile[14] – equivalent to a 0.3% overspend against profile. Compared to the profile at both interim evaluation stages, the completion of Future Farm has largely addressed that historical underspend. The completion of Future Farm through the second half of 2020 allowed the project to largely complete its capital spend obligations.

The capital expenditure profile throughout the project period reflected an assumption – as expressed in PCR2 – that the Future Farm Platform would commence construction in Q3 (July-Sept) 2019. In the event, it did start construction as planned but the pace of work was significantly affected through the winter and spring 19/20 and some underspend occurred. Future Farm was completed in the latter part of 2020 and one of the further justifications of PCR3 was that an extended project period would allow for 12 months of research to be conducted through the facility before ACP completes. Again, the approval of PCR3 allows for that objective to be met, and the early indications (as discussed elsewhere) are that it is proving a valuable asset.

[14] *This reflects a slightly higher demand for capital innovation grants*

Chart 3: Capital expenditure against revised (PCR2) profile



Source: Project financial claims

Financial analysis on a delivery partner basis highlights some aspects which are useful to highlight:

- The demand for 'revenue' innovation grants had tended to be lower than 'capital' grants through the programme period. However, with more businesses evidencing expenditure in the last couple of quarters, this differential has been reversed. Up to June 2021, there was now only c3.5% remaining of the capital grant allocation (the total allocation equating to c£368,000), compared to c2% of the revenue grant allocation (the total allocation equating to c£279,751). It is useful to note that this high allocation for both capital and revenue grants has also partly been as a consequence of lower allocations being reflected in the latest PCR3, particularly around the revenue grant allocation. This re-profiling, combined with greater evidencing of expenditure by those approved projects, has resulted in much greater confidence that the budget allocation for innovation grants will now be met.

  As discussed through the previous interim evaluation stages, the allocations for innovation grants have 'flexed' throughout the programme period – reflective of the demand being quite fluid.

- Expenditure against profile for the research partners has differed. Whilst the University of Plymouth has incurred costs marginally more than its allocated contract total, other partners have not been able to reach the financial allocation as reflected in the contract total (PCR2). Given that the research activities for Rothamstead Research, the University of Exeter the University of Plymouth have completed by the end of June 21 then some of this funding will be spent taking forward other elements to the closure of the project.

Overall, this analysis of project expenditure has shown that through the lifespan of the project it has faced different issues in maintaining expenditure against the target profile. Initially the problem of underspend related to capital – reflecting the delayed construction of Future Farm. That issue was addressed as the building was completed. The issue then switched to a revenue underspend, particularly as Covid-19 negatively constrained delivery through 2020 and into 2021. The extension of the delivery period to December 21 therefore appears a pragmatic outcome to allow the project to fully deliver against its financial commitments – as well as allowing aspects of the project such as innovation grants to meet any outstanding demand.

Table 5: Project expenditure against profile

Indicators / Expenditure	Original Funding Agreement	Revised in PCR2 (and maintained in PCR3)	Total achieved at time of evaluation	% of target	Projected to be achieved at Project Closure	% of target
Total project costs	£10,213,587	£11,845,908	£10,854,450	91.6%	£11,845,908	100%
ERDF Revenue Expenditure (£m)	£6,384,065	£7,477,500	£6,750,915	90.3%	£7,477,500	100%
ERDF Capital Expenditure (£m)	£1,305,637	£1,446,714	£1,418,720	98.6%	£1,446,714	100%
ERDF Total Expenditure (£m)	£7,689,702	£8,924,214	£8,169,635	91.5%	£8,924,214	100%
Public matched investment (£m)	£2,026,490	£2,415,104	£2,532,824	105%	£2,532,824	100%
Private matched investment (£m)	£497,395	£487,354	£455,085	93.4%	£487,354	100%

Key less than 85% between 85% and 95% Greater than 95%

Conclusion

This section draws our evaluation conclusion in relation to the overall Summative Assessment question of progress against contractual targets, reasons for differences and expected lifetime results. For this section, the key should be read as:

red = target will not be met

amber = target will be partially met

green = target should be met

This assessment is largely undertaken against the targets and financial profile that were reflected in PCR2 – approved in 2019.

SA evaluation question	Comment
Performance against ERDF output target	Overall, the project has done well in achieving a significant scale of ERDF outputs, in many cases significantly exceeding those levels as reflected in the original Grant Funding Agreement (albeit this was based on a lower financial allocation). It has supported many enterprises and has particularly supported many in cooperating with research institutions. It had built good momentum before the impact of Covid-19, which has subsequently slowed delivery – particularly for those elements that involved direct financial assistance. Consequently, those ERDF outputs associated with the drawdown of direct financial assistance (C2 and C6) are behind intended levels as it stands. This is reflected in the green/amber rating from an overall perspective. The extension of the project allows for output delivery to continue and indeed increase.

Performance against financial spend target	Throughout the delivery period the project has faced some difficulties in maintaining activity and expenditure to the profile as set out in the original Grant Funding Agreement and subsequent Project Change Requests. In broad terms, this underspend has shifted from one associated with capital spend – principally due to the delays within the build of Future Farm – to revenue spend in the latter part of the delivery period. Covid-19 has impacted both capital and revenue elements. However, we feel it appropriate to highlight that – as of June 21 – the project had delivered c96% of its intended total, equating to c£11.3m. This is a considerable achievement, particularly when placed in the context of some uncertainty of demand at the outset of the project and those significant external factors which impacted in the latter period of project delivery. The project has been financially managed in a robust manner, with the lead organisation working closely with all delivery partners to ensure momentum. The green/amber rating does not reflect this financial management – which we consider has been strong. It simply reflects that throughout the delivery period the project has tended to lag (significantly so at certain junctures) the intended expenditure profile.

GLAS DATA

Glas Data was an industry partner alongside Rothamstead Research and Duchy College through the ACP supported Farm Visualisation (VizAg) and Dairy Cows Welfare research projects. It is also received an Innovation Grant through ACP, as well as hosting a graduate placement.

Glas Data was established in 2018 in order to tackle the issue of data fragmentation in the food sector. Fundamentally, if we are to achieve a more productive and also more sustainable future, deep and complex data analysis will be required. To date the agricultural sector has not been able to do this effectively. This is due to data points either not available/collected or ending up siloed and in effective islands where they cannot be cross correlated. Glas Data tackles this rather large problem by creating a dynamic system that is able to flex to any source and structure of data. It offers data collection, visualisation, mapping, real time alerts & statistical analysis.

Since its involvement with ACP, Glas Data has secured 2 main rounds of finance to date with a 3rd under way. To date the company has secured circa £500k in investment and employs 6 members of staff.

Glas Data now has over 100 users and several hundred deployed sensors from Cornwall to Scotland. The company has brokered key partnerships and collaborations with local hardware supplier Verfacil (also supported through ACP) and continues to collaborate with Rothamsted Research amongst others. External finance will continue to expand the deployment of IoT & smart technology. Given the ongoing global pressures on the agricultural industry, the business anticipates exciting potential growth in the next couple of years.

https://glas-data.co.uk/

glasdata

As set out in the ITQ and the evaluation framework that was developed as part of the Formative Evaluation, this section responds to Summative Assessment questions in relation to:

- Was the programme well managed with the right governance and management structures?
- Was the composition of the steering group appropriate? How effective has it been in providing guidance?
- Has the project delivered its intended activities to a high standard?
- Was the delivery team structure effective?
- Did the project engage with and select the right beneficiaries? Were the right procedures and criteria in place to ensure the project focused on the right beneficiaries?
- Were the application and claims processes user friendly?
- How are project activities perceived by stakeholders and beneficiaries? What are their perceptions of the quality of activities / delivery?
- To what extent have the horizontal principles (e.g. equality & diversity, sustainability etc. as defined by ESIF) been integrated into and shaped delivery?
- Were the potential environmental impacts of the proposed research projects effectively appraised?

Project Design

Project Design – delivery model

The consultations held with the delivery partners through the evaluation process generally indicated a view that, after some initial issues in the early stages of the project, the delivery model developed and matured. This was partly as a result of greater understanding of roles and responsibilities across the partnership, some evidence of closer joint working and greater visibility of the project. Whilst the delivery model has not necessarily been perfect, all partner organisations have worked hard to make it work. Overall, there has been good leadership provided through the Programme Director.

The key findings through the various evaluation iterations have been:

Definition and sector maturity

- One of the key issues that faced the project from the outset was that 'agri-tech' (which remains not easy to define) was not as mature or as well-developed as originally envisaged. It is important to highlight that those views about the maturity of the sector were partly informed by assumptions made at a strategic (EU Structural Fund) level. Project partners responded to a Priority Axis One 'Call' which was informed by the C&IoS Integrated Territorial Investment Fund. This identified that agri-tech represented an emerging market opportunity for support through the ESIF. Therefore, there was an overstated view of the sector at a strategic level.

  The implications of this for early project delivery was that there were fewer eligible SMEs to work with in this space when the project commenced. This influenced the ability of some research partners to quickly move into a delivery phase.

- As a result, many of the research partners (although not all given their different starting positions) had to expend reasonable effort and resource on stimulating demand in the early phases of the project. This took more time and effort than planned in the original ERDF application.
- The problems highlighted above were exacerbated by the limitations on the project of not being able to directly support primary agricultural producers – the Annex 1 issue. The expectation among project partners when developing the original ERDF application was that direct support to Annex 1 businesses was to be an eligible activity. The ineligibility of Annex 1 businesses was only fully clarified after funding approval. This obviously and significantly limited the pool of businesses that the project could directly support, partly leading to some of the early difficulties in delivering against some of the contracted ERDF outputs.

Early-Stage Delivery

- Within the original Grant Funding Agreement, the output and expenditure profiles were effectively 'flat lined' from the commencement of the project. Therefore, the expectation around output delivery and associated expenditure did not factor in any element of capacity building within the project, allowing it a slower build-up of activity. This resulted in the project immediately playing 'catch-up' on output delivery, research expenditure and defrayal against innovation vouchers. This has accentuated the problems highlighted elsewhere in relation to the need for demand stimulation (see above), and the late start for the project (see below).

  It is our view that this was a flaw in project design. It is not clear why the profile was designed as such. In normal circumstances, it would have been realistic to expect project activities to slowly develop over time, particularly given that some research partners were less experienced in delivering an ERDF project e.g. managing ERDF compliant processes.
- The project effectively started in April-May 2017, later than the original intended start date of January 2017. Project partners were not willing to commence project activities 'at risk' until the Grant Funding Agreement had been signed by the Managing Authority. Whilst the implication of this late start has now been largely negated by the various project extensions that have been approved, it did provide early pressure on delivery and the sense of 'catch-up' that pervaded in the early stages of the project period.
- The project partners – both collectively and individually – spent a great deal of time seeking clarification on several issues from the Managing Authority in the early part of the project. In some instances, there was ambiguity over the guidance received, or it remained open to interpretation. In many cases Duchy College as the lead organisation worked diligently on behalf of the wider partnership to seek clarity, with many project partners recognising the important role that Duchy played on behalf of the project. However, this took valuable time and resource in the early stages of the project and diluted focus away from delivery. The time and resource implications of seeking these clarifications in the early stages of the project should not be underestimated.
- The delivery partners were at different stages of formulating potential collaborative research projects when the project commenced. Some - notably Plymouth University - had several research proposals developed – sometimes with an already identified industry partner – which they were able to relatively quickly bring to the SSG for consideration. For other partners, research proposals were less well formed at the outset, and took time to develop. Given each collaborative research project involved academic and industry partner

engagement, this resulted in implications for the speed and profile of research activity through these early stages.

- The preparation time that was required for commencing the collaborative research projects should not be underestimated. Many research projects needed to recruit specific external researchers with the requisite skills and experience, and this took longer than originally envisaged. This often resulted in elapsed time between the approval of the collaborative research project and starting in earnest. In part, this also relates to the above point regarding some research partners not necessarily having a 'pipeline' of projects.

Partner Collaboration

- The original ERDF application clearly set out an intention for the research partners to work collaboratively on some of the potential research proposals. This cross-partnership working was to be an important attribute of the delivery model, bringing together the specific strengths of each partner. In the consultations with held with the partners, it was apparent that they also held this expectation. It is clear this did not develop as originally envisaged. Most collaborative research projects have involved an industry partner(s) working with a single research partner. There have been a small number of projects where two partners have worked together. Duchy College has been involved with each of the other research partners on at least one collaborative research project. Outside of Duchy College, it is useful to highlight that none of the other research partners have worked jointly on a collaborative research project.

Previous recommendations for a greater focus on collaborative activity did not necessarily result in more joint research projects being brought forward. However, through the evaluation process we were also mindful of collaboration only being useful if it could have been demonstrated that the collective expertise of the partners would have brought benefit to a particular research proposal. We recognised that forcing collaboration could have meant 'placing square pegs in round holes' and that many of the research projects were simply more suited to a single relationship between the research institution and industry partner. However, we would still maintain our view expressed through the evaluation process that this has been a missed opportunity. This view was also expressed by other stakeholders in our wider consultations. Perhaps the greatest significance of this outcome is that there is limited evidence that the project has created a long-lasting relationship between some of the key research partners within the 'agri-tech' sphere. The feeling has remained that the project has strengthened bilateral relationships, but not necessarily multilateral relationships.

Having stated this, there have been elements of the project where linkages have developed well (and as intended in the original delivery mode). Principally, there are good examples of where involvement in a collaborative research project has led to a business pursuing an innovation grant (or vice versa). Several of those businesses involved in the former have progressed onto the next stage of development and sought financial support through the innovation grant.

This synergy for some businesses (although noting not all) is demonstrated by the response to a question in the online survey which questioned the relationship between the collaborative research project and innovation grant. In total, 12 businesses who were involved in a collaborative research project also received an innovation grant.

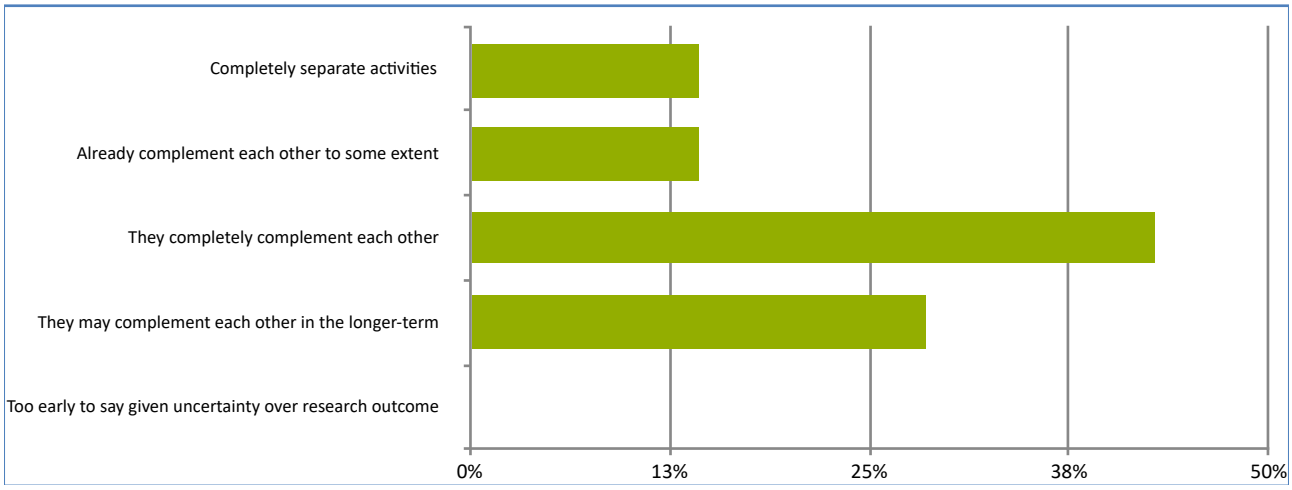
- One of the reasons for this lack of collaboration between partners may have been explained in part by the relatively limited pool of eligible 'agri-tech' businesses – certainly

in the early stages of the project. Initially, this may have created a more competitive – rather than collaborative – environment, although we feel that this issue dissipated as the project progressed. Research partners were initially mindful of the need to meet their own output targets, and as such were placed under more initial pressure to focus on securing their own industry partners.

	Rothamsted Research	Duchy College	University of Plymouth	University of Exeter
Cell Grazing	●			
PhosField	●			
VizAg	●			
TOMS	◖- - - - - - - - - -	- - - - - - - - - - ◗		
FABSoil			●	
Plant Factory			●	
ABC - Brassica Harvesting Robotics			●	
Speciality Crops - Coastal Plants			●	
FIND - Fluorescent Imaging			●	
SmartVit				●
Genetic Modelling of Lobsters				●
Dairy Cow Welfare & Management		◖- - - - - - - - - -	- - - - - - - - - -	- - - - - - - - - - ◗
Bovine TB		●		
BioDigest - Anaerobic Digestion				●
Starlings				●
Circular Economies - Insects				●
Soil Carbon	◖- - - - - - - - - -	- - - - - - - - - -	- - - - - - - - - - ◗	
Farm Crap App Pro	◖- - - - - - - - - -	- - - - - - - - - - ◗		
Two Minute Farmer		●		
ClimateHub				●

It is important to recognise that careful interpretation is required with regard to the responses to consultations and online surveys that have been undertaken as part of this evaluation. We are aware that the results of the online survey in particular may reflect an element of 'selection bias' i.e. those businesses that have had a more positive experience may have been more inclined to respond to the survey. This may positively influence the findings and may mean that those responses are not necessarily fully representative of the overall view. This is highlighted in the context of interpreting the feedback appropriately.

Chart 4: In terms of the relationship between your involvement in the collaborative research project and the innovation grant, how closely are they related in your business operations?



Source: Beneficiary online survey (n=10)

The problem of research partners needing to make links with potential industry partners within an initially relatively limited pool, and the resultant lack of collaboration, may have been accentuated by a lack of a central business engagement resource. This may have helped coordinate activity in a more targeted and effective manner. In our consultations with the partners for the initial interim evaluation it was apparent that some assumed this central resource was going to form part of the project delivery model.

In the early stages of the project this resulted in a proliferation of business engagement within the project, with each research partner and CDC undertaking their own separate activity. Whilst there have been referrals – most notably by CDC to research partners if a potential industry partner has been identified – it could be argued this has consistently been an inefficient use of resources. Whilst personal relationships between members of the Project Management Group have helped the informal flow of referrals, a single business engagement resource may have been useful as an ongoing resource (for all partners) throughout the project.

Whilst the research partners individually and collectively provided a valued resource to eligible SMEs, it could be argued that only being able to access expertise within the partnership was on occasions restrictive. For some agri-tech focused businesses within CIoS it may have been more appropriate to access expertise from an institution outside of the ERDF programme area. In that sense, the geographic limitations of the ERDF funding support were slightly restrictive. However, our sense was that this was not a significant issue for most SMEs supported.

The research partners have previously highlighted that they maintain good links with research institutions elsewhere, often globally, and by working closely with an industry partner they were able to indirectly provide access to a wider set of expertise if appropriate/required.

Applied research in an ERDF environment

Given the slow start for several research projects, this initially resulted in many of the collaborative research projects being condensed into a two-year period. Given the nature of the applied research, much of which was subject to variable weather and seasonal conditions, this raised a fundamental question in the early stages of project delivery. The time constraint of undertaking scientifically robust research within a condensed timeframe raised an initial question about whether this type of applied research was suitable within an ERDF funding environment. However,

we feel this issue has now been largely negated through the various project extensions that have been approved. By the end of December 2021, the project will have covered a delivery period of 4.5 years, and this should be seen as a sufficient time period.

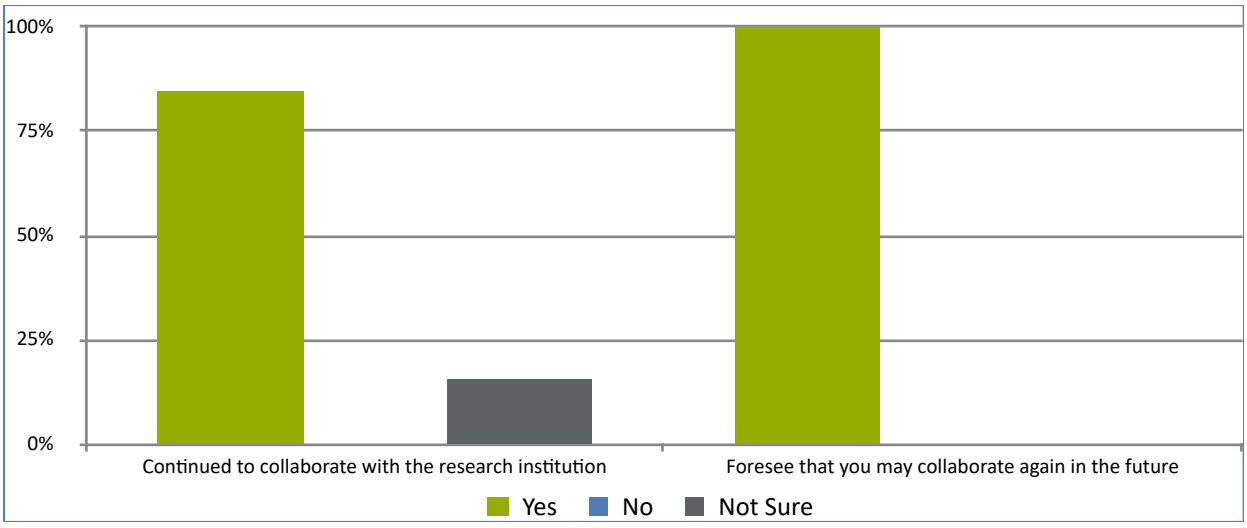
For some research partners, the project extension(s) allowed existing research projects to be extended. In other cases, some new projects were developed by delivery partners.

Our previous consultations with delivery partners highlighted the intangible benefit that ERDF funding has brought in terms of facilitating relationships with SMEs that they may not otherwise have had the capacity (or remit) to pursue. Overall, the project has allowed all delivery partners to develop a greater awareness and understanding of the nascent agri-tech sector within CIoS (and wider area) – and the needs of businesses. As previously stated, the delivery partners all started from different positions in terms of local SME engagement. For those organisations that did not have a well-developed level of engagement with local SMEs, the ERDF support helped them to establish relationships which their traditional funding streams would not necessarily have facilitated. Some of the relationships have developed further through applications for further research funding. The key question will be whether these longer-term relationships will be maintained, or whether they are difficult to maintain in the absence of financial support.

The ERDF support has provided a firm foundation upon which further development and activities are continuing to evolve. Our consultations with delivery partners have highlighted that the majority of research projects continue to develop in some form – even if the activity funded through the project has finished. The project has helped build awareness of opportunities in agri-tech/agri-food within the research partners and have provided the building block for further initiatives. For example, the establishment of the Exeter Centre for Circular Economy followed on from the University of Exeter developing a better understanding (and academic interest) in the area of sustainable food production.

The indications from the business perspective are also encouraging – as illustrated in the below chart. This broad intention to continue a relationship with relevant research partner(s) also came through strongly in our beneficiary consultations.

Chart 5: Have you continued working with the research institution on other (related or unrelated) activities or do you foresee that you may collaborate again in the future?



Source: Beneficiary online survey (n=14)

Management and Governance

Project Management

The project has been seen as well led from an organisational perspective through Cornwall (Duchy) College's role as the accountable body and lead organisation. The project has been seen by partners and members of the SSG as well managed. Duchy College, particularly the Programme Director and support staff, has provided good leadership and support to the wider partnership. As previously stated, the College worked hard from the outset of the project (and continues to work hard) to seek clarification on several significant issues that faced the project.

It was recognised that Duchy College was well placed to act as the lead organisation for the project. It has long and well-established links with the agricultural community within CIoS and the wider region, and as part of the Cornwall College group it had extensive experience of delivering EU projects, including ERDF projects. It is important to reiterate that it was willing to act as the lead organisation within a partnership model, when some of the other partners were reluctant, or less well-placed to do so.

However, the initial interim evaluation highlighted an issue that was identified for consideration by the partnership moving forward.

- Duchy College acted as one of the research partners, directly delivering some collaborative research projects, as well as acting as the lead organisation. In some forums the programme director had to act as a representative of Duchy College as a research partner as well as the lead body. Some partners queried whether this dual role created difficulties for the programme director in acting in an independent manner. Everybody we previously consulted felt that the Programme Director had managed this tension well, but most felt that this situation should have been managed through a clearer separation of roles, rather than reliant on the professionalism and discretion of staff. It is not clear whether a previous recommendation to create a more 'formalised' separation was considered and/or implemented. We previously advocated that a representative of Duchy's research activities (in addition to the Programme Director) attended both the Project Management Group (PMG) and the SSG to ensure a separation of roles.

Through the evaluation process the overall project management structure has been seen to broadly work. In particular, the Project Management Group has been seen as a good open forum for discussion and understanding of project progress – including the activities of each delivery partner. It has helped facilitate stronger relationships between key individuals. For some of the delivery partners that were less experienced at delivering ERDF projects at the outset, they were provided with good support from Cornwall (Duchy) College in the early stages. Consequently, they were able to develop their own processes and approach to manage an ERDF-compliant project. This was done through a combination of developing organisational experience and bringing in individuals with the right skills and previous knowledge.

In addition, the researchers group meetings were also cited as a useful development in making important links between the research activity and institutions. Pre Covid-19, this allowed a greater understanding of activity across the collaborative research projects. It has also facilitated some cross-referrals within the project.

Role of the Strategic Steering Group

Throughout the project, the Strategic Steering Group (SSG) has been a central tenet of the management and governance of the project. In particular, it played an important role in challenging and appraising collaborative research proposals as they have developed. Through the early evaluation phases some issues were raised which are reflected again below.

- There had been conflicting views amongst the research partners regarding the role that the SSG had played in providing challenge to the research proposals as they were brought forward. On the one-hand, some welcomed the independent challenge that it provided and cited an improvement in the final research proposal as a result of this challenge. For others, given that the research partner had identified the research need, was providing its own resources as matched-funding, and that the industry partner had also identified the activity as a priority from their perspective, they questioned the appraisal role of the SSG.

  Overall, there has not been a consistent view. Members of the SSG, as well as those involved in managing the overall project, have felt that it played an important role as a 'counterweight' to the research partners. Specifically, they felt that added value was provided in questioning the potential application (market potential) of the potential underpinning product/service.

  In overall terms – particularly given the programme focus – we would agree with that view. On balance, it is our view that the SSG has provided a useful role in appraising projects and helping to ensure that there was an 'applied' element to the research proposals being brought forward.

  It is our independent and objective view that the SSG has been well-engaged in the programme, with many members maintaining their presence throughout the 4+ year programme period. The project has been successful in engaging with private sector representatives from agricultural and agri-related businesses and many have lent considerable time and effort in guiding the project. Certainly, the Programme Director has found the SSG a useful forum in which to discuss the scope and emphasis of project delivery.

- In the previous interim evaluation, given the focus had shifted from its appraisal role, we felt it was opportune for the SSG to reflect on its role moving forward. Given the considerable fluidity of the post Brexit environment – not least the withdrawal of the CAP-based support mechanism (as discussed in the earlier policy section) we questioned whether the SSG could play a greater 'strategic role' in helping to shape future activity and respond to other opportunities that may arise.

  Within the interim evaluation we felt this may have resulted in a slight shift in emphasis in the Terms of Reference for the group, a review of its membership, or simply a greater recognition by the group itself that it had a slightly different and wider role to play.

  Whilst the specific focus of the SSG may not have formally altered in the final phase of project delivery, it has been involved in several discussions around strategic direction and future options. Again, in our view this highlighted how engaged and interested SSG members have been with regard to the future development of the agri-tech sector within Cornwall (and wider area). Many of these 'future' discussions have been led/facilitated by the Programme Director, with useful industry focused input from SSG members.

Quality of Delivery

Experience of Beneficiaries

The feedback that we received from businesses that have interacted and been supported by the project has been broadly positive. The feedback and experience of beneficiary businesses is reflected below in terms of those which either interacted with the project through the collaborative research projects and/or innovation grants. In terms of the latter, this has been informed by consultations, responses to the online survey circulated as part of this evaluation and also feedback that was contained in the project monitoring reports.

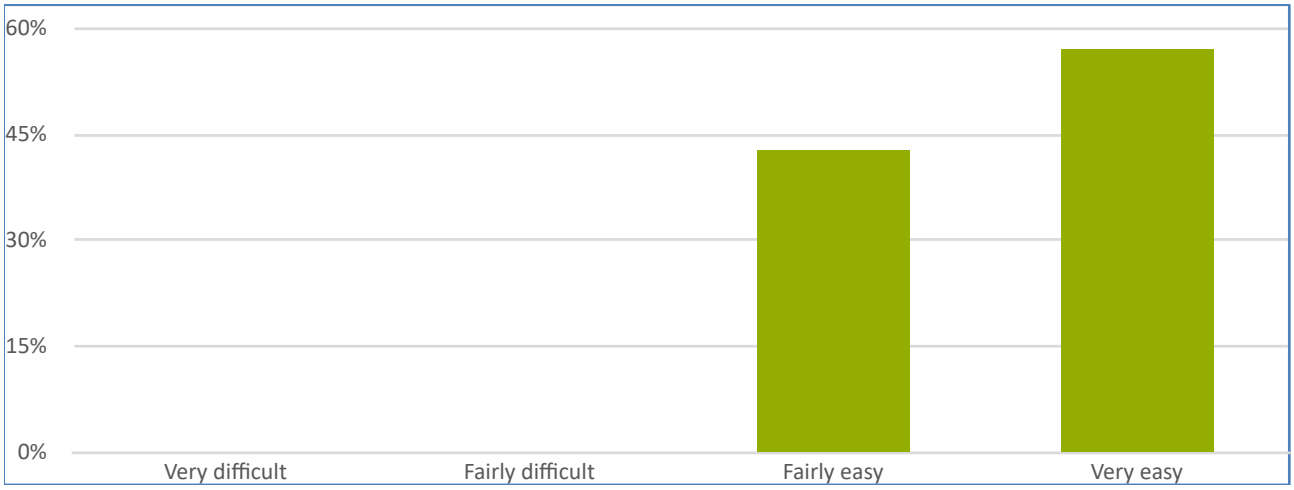
Collaborative Research Projects

In the consultations that we have undertook through the various evaluation iterations, the majority of businesses expressed satisfaction with how they interacted with, and supported by, the research partners. It is useful to highlight that the depth of some of those relationships tended to differ on a case-by-case basis, with some businesses interacting relatively 'intensively' with their respective research partners, whilst others kept a more watchful stance.

Most were happy with their initial engagement, the accessibility of the partner, and the expertise provided. In many cases, their view on the quality of support provided was very much personal – based on the relationship that they had with a particular individual within a research institution. The willingness of research partners to step beyond their institutions and engage meaningfully with businesses is a key learning point for the future. Only a couple of businesses we spoke to expressed some elements of dissatisfaction, commenting on the difficulties of aligning the speed needed for commercial requirements against the procedures adopted in an applied research environment within academia.

As Chart 6 illustrates, most businesses who responded to the online survey were satisfied with the ease of working with their respective research institution. This confirmed a similar picture in the previous evaluation phases – including those businesses we directly spoke to.

Chart 6: How easy did you find it to work with the research institution to develop a project that addresses the needs and interests of your business?

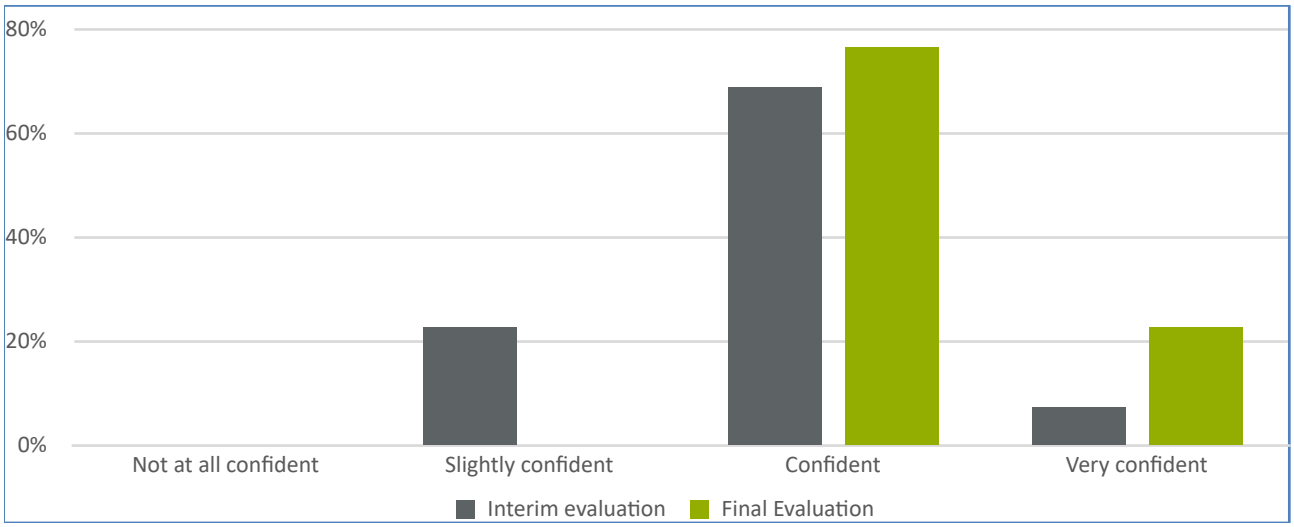


Source: Beneficiary online survey (n=14)

Overall, there is some good confidence that the objectives of those businesses that were involved in a collaborative research project had been met. In many senses, this partly reflects the stage of the commercial/RD&I journey that many businesses were in – as shown earlier, many businesses required initial investigations/proof of concept support, and these were satisfied.

Again, the responses to the online survey broadly confirmed previous responses in the interim evaluation stage – as shown in Chart 7. The chart indicates some broad 'firming' of confidence in terms of achieving objectives.

Chart 7: Overall, has your involvement in this collaborative research project met your original objectives i.e. it has led, or has the potential to lead, to successful outcomes for your business?

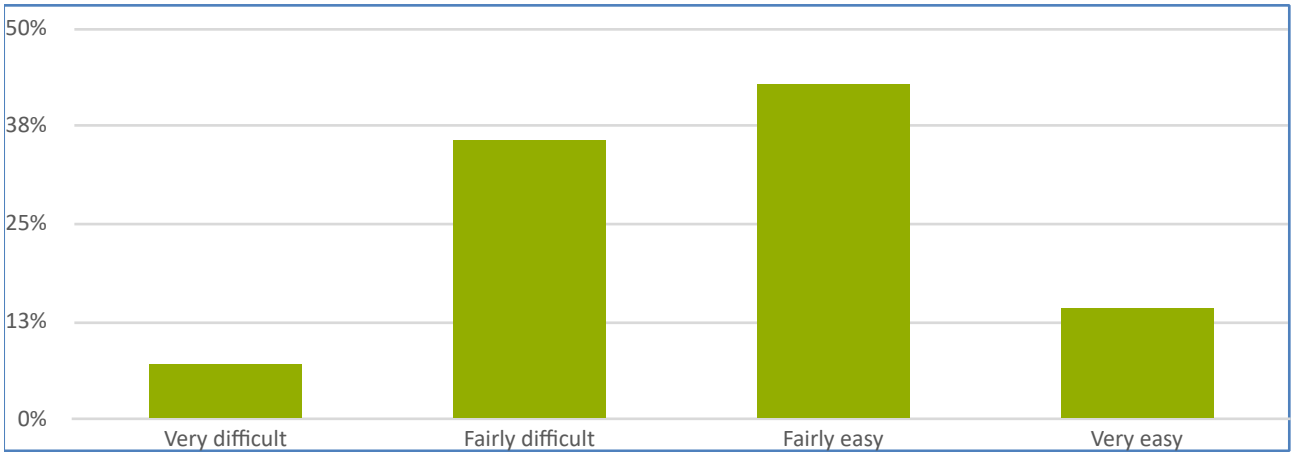


Source: Beneficiary online survey (n=13, n=14)

Innovation Grants

In terms of business views on the ease of accessing the innovation grant support, Chart 8 indicates mixed views, with a split in responses across those that responded to the online survey.

Chart 8: How easy have you found it to apply and secure an innovation grant?



Source: Beneficiary online survey (n=14)

However, this feedback differed slightly against that received through the project monitoring reports completed by those businesses that has completed their innovation grant project.

Of the 22 projects that had completed their innovation grant project, 20 reported that the process had worked well and that they had received good or excellent support from the project team, with many projects very complimentary of the quality of support received and some naming particular team members for the service provided.

Six projects reported that the paperwork for the scheme was time consuming and burdensome to complete. One mentioned difficulty regarding the stickers confirming authenticity of original

documentation, while another complained about the need for paper-based rather than paperless documentation. One project stated that they had to restart the application process due to a staff change, leading to a four-month delay, but that they had received good support after that.

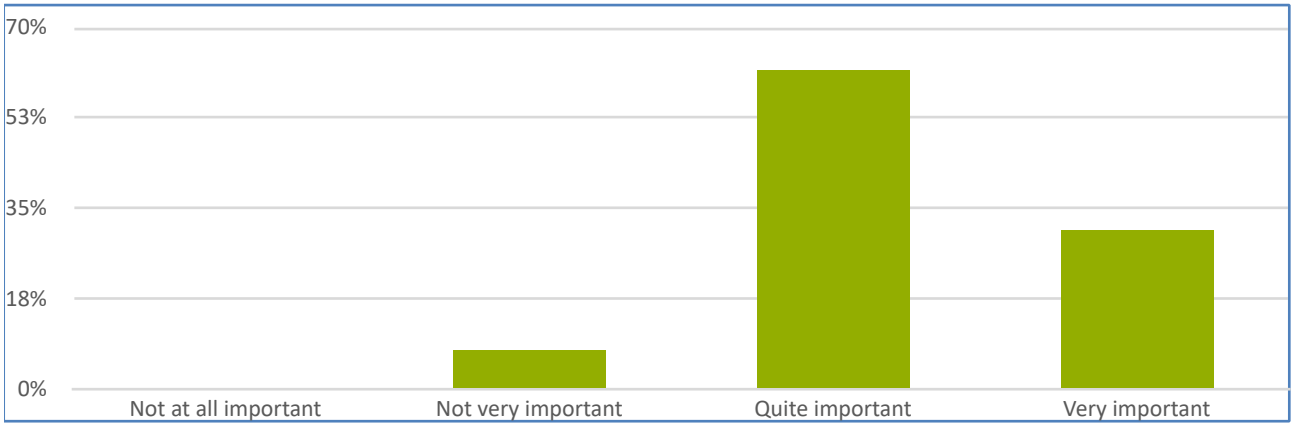
In our consultations we received positive feedback from those businesses supported through the innovation grant scheme. Some businesses did highlight the relatively slow process of approval and their perception of relatively stringent requirements in terms of evidencing eligible expenditure. However, equally those businesses also recognised that they had received public investment and that there were necessarily checks and processes which needed to be adhered to. Several of those businesses we spoke with also cited good communication from the team in terms of indicating how the appraisal process was working, as well as ongoing support post-approval.

We recognise that – as always with schemes involving public investment – there is a fine balance between ensuring compliance and putting in place a process which is 'business friendly'. On review of the process throughout the delivery period, our independent view has been that CDC has managed the process effectively and with good ongoing commitment – working diligently in stimulating demand. In that respect, it has been helpful to use CDC's existing networks and communication channels to advertise the funding opportunities (see earlier comment regarding the use of social media channels).

In addition, in our view the appraisal of innovation grant applications has been managed through a process which appears commensurate and practical when placed in the context of the size of the grant applications. CDC is experienced in managing innovation grant schemes. For those applications greater than £25,000 the application was appraised by an Innovation Grant Advisory Board constituted of public and private sector representatives which scored the project against the schemes objectives. This forum provided the appropriate assessment. All projects were then subjected to a technical appraisal and compliancy check.

In terms of the role that the innovation grant had played in promoting the businesses' objectives, the responses received have been positive. Chart 9 indicates that the majority of those who responded to the online survey felt it had been either 'quite important' or 'very important' in terms of improving their ability to innovate.

Chart 9: How important has the support been in improving your ability to innovate?



Source: Beneficiary online survey (n=13)

19 of the 22 projects that had completed a project monitoring report stated that they had developed products that were new to the company, although some of these products had yet to be commercially launched. Of the other three projects, one had a product still under development, one concluded that further R&D effort would be required, and one had been unsuccessful in developing its new product.

13 of these 19 projects claimed that their product was entirely new to the market, though in some cases it appears that there are similar products on the market and that the product was not entirely unique, so there may have been some issues in interpretation of this question.

Integration of horizontal principles

Environmental sustainability and equality and diversity are two important 'horizontal principles' in any ERDF project.

In terms of equality and diversity – all staff appointments made in the project by delivery partners were done under well-regulated equality and diversity policies. Each of the delivery partners had an equality and diversity policy in place, helping to promote an inclusive workforce. Whilst not a specific focus of the project, all activities that were provided were open and inclusive in terms of individuals who could engage with the project.

In terms of environmental sustainability – almost all of the collaborative research projects that were supported through the project had aims to support sustainable development, with an increasing focus on achieving a lower carbon impact. As the project has been delivered, more evidence has emerged of the carbon impact of activities associated with agriculture and this was increasingly reflected in the focus of activities. Examples of the sustainability focus of some of the collaborative research projects are highlighted below.

Soil carbon project – aimed at increasing carbon sequestration, soil health and better water retention (less water run-off and soil erosion).

Farm Crap App - aimed at aimed at increasing micronutrients available to soils, sequestering carbon, and improving soil health; whilst helping reduce artificial fertilizer consumption, and pollution from farm wastes into water courses.

Plant Factory - creating fine-tuned LED lighting (using less energy to deliver maximum benefit to crops), linked to the use of photo-voltaic panels incorporated in building design.

FABSoil – convert waste from mining into fabricated soil for remediation and use in horticulture. Aimed at taking infertile waste (especially from mining and construction) and converting it into a healthy fabricated soil.

Phosfield - aimed enabling the accurate measurement of soil phosphorous to ensure the correct use of fertiliser and reduce pollution to the soil and water course (as well as the depletion of a finite resource – Phosphorous)

Toolbox of Multi-Species Swards - toolkit to enable bespoke fine-tuned swards (pastures) for agriculture. Aimed at increased animal nutrition and welfare, improving the quality of soil and pasture, and the biodiversity associated with pasture.

Communications and Publicity

It was the intention of the programme to undertake an extensive range of dissemination events to outline the outcomes of the collaborative research projects as they develop. Given that the project's activities took some time to develop momentum, it was intended that dissemination would quicken from 2019/2020. However, this element of the project was particularly adversely affected by Covid-19 – effectively meaning that face-to-face workshops were not possible.

As with much other activity the project reacted to the restrictions – moving to hosted online workshops as an alternative. However, several stakeholders have felt that Covid-19 struck at the worst possible time in terms of the project's dissemination plans. The dissemination events held since the start of 2019 are shown in the diagrams below.

The 'Growing Back' webinars were part of a wider 'thought leadership' initiative that looked at the future of food, farming and regenerative land use. These were developed during the Covid-19 lockdown period. Working with the CIoS LEP, the Agri-tech Cornwall project was a key driver for this series of webinars that focused on a range of different issues (as indicated below), pulling in relevant speakers. The series of 5 webinars was held in July 2020, focusing on the following topic areas:

- Setting the Scene – 27th July 2020
- The Climate Challenge – 28th July 2020
- A Regenerative Approach – 29th July 2020
- Food Systems – 30th July 2020
- Pulling it Together – 31st July 2020

The Programme Director has been relatively 'visible' across the agricultural sector over the period and acted as a representative and promoter of the project in several forums, with a particular focus on innovation within an agri-tech/agri-food/environmental management perspective.

Our analysis of the feedback provided by participants who attended the events (covering the period 2017-19 when they were physical events) was that these were well received – with feedback positive – the majority of delegates scoring each event 4 or 5 out of 5 for content and usefulness.

It is noticeable that not all collaborative research projects have yet held a dissemination event, nor or they expected to before the project completes. This partly reflects a combination of factors - the different stages of research activity, the applicability for external dissemination and the disruption caused to the intended programme by Covid-19.

The project has an active Twitter account which has also served as an effective marketing and communication tool. All research partners have utilised this channel to raise awareness of developments in their own projects, it has been used to promote the successes of some of the businesses that have been supported through the project, and also been used by the project to refer to wider developments in agri-tech. This account currently has c880 followers and has generated 1,000 tweets since June 2017.

In addition, CDC also established a separate Twitter account to promote the innovation grant element of the programme. This has c650 followers and generated c1,250 tweets since the account was established in October 2017. CDC also established a Facebook page to promote the innovation grants.

In addition to the above workshops (and online seminars), the project has linked to a range of other events with the intention of raising the profile of the overall project, Cornwall's role in developing its own agri-tech sector (including highlighting its strengths), and its evolving strength in RD&I activity. This has been useful to raise the profile of the achievements of the project, as well as highlighting specific research outcomes and businesses that are developing agri-tech solutions. The delivery partners felt that this wider exposure played an important role.

The one issue that was highlighted in previous interim evaluations was the feeling that the project would benefit from communicating more widely outside of its 'community of interest' i.e. to the wider general population. It was felt – although not necessarily raised uniformly by those we spoke with – that given the expected changes to agricultural and food policy over the coming years (post Brexit) that the role and positive impact of the project should be highlighted more widely.

We feel it important to highlight that the project responded to these previous observations. It developed a series of press releases for local news publications – focusing on some of the achievements of the project. It linked into events such as the Royal Cornwall Show and the recent G7 event held in Cornwall. It also developed a series of case studies (some of which are reflected through this report) to highlight the objectives and achievements of some of the collaborative research projects. The above social media tools were also used as channels to disseminate to a wider audience, although it is realistic to expect that this was largely still used by those within the 'community of interest'.

Several of the businesses that we spoke to cited the usefulness of being part of a wider agri-tech/ agri-food network that had been created by the project. Some of these networks have been associated with individual research projects, whilst in other cases it has been driven by the wider networking activity of the project itself. Whilst this is largely a 'soft outcome' it was seen as important by many and has the potential (which in some instances have already been realised) to create ongoing relationships between businesses. However, there is again a question about whether a 'Cornwall-based' network is too limited. The benefits of networking can be limited by the size of the agri-tech sector in Cornwall, with the real benefits being part of national/ international networks for relevant specialisms.

Conclusions

For this section, the key should be read as:

red = target will not be met

amber = target will be partially met

green = target should be met

SA evaluation question	Comment
Project design	It was clear in the early stages of the project that the agri-tech sector was not as developed as perhaps envisaged when the ERDF project application was developed. Therefore, the early stages of the project – for several elements – meant more demand stimulation than originally envisaged. This meant that the project had a slower start than planned (accentuated by a delay in start date) and many of the delivery partners spent considerable time and effort in identifying and engaging with SME partners. This was true of both the collaborative research and innovation grant strands. It may have been beneficial to have central business engagement resource within the project to have made this a more efficient process. The original intention was that the research partners would bring their considerable expertise to the project, from both an individual and collective sense. From the perspective of the former, we have good confidence this has occurred and benefited businesses. There have been fewer multilateral collaborations across research partners than hoped, although there are certainly several cases of joint working on some projects. Another element that was important to the project design was the link between the collaborative research projects and the innovation grants. We feel this has worked well, strengthening as the project progressed. There are certainly some instances of a business testing/developing a 'proof of concept' and then using innovation grant support to further develop those ideas. At least 17 businesses that benefited from an innovation grant, as well as being involved in a collaborative research project. The graduate placement element of the project has been well regarded and was working well before the impact of Covid-19 curtailed momentum. Having a 'workforce/skills' element was seen as a useful complement to the overall aims of the project.
Management and delivery	The feedback that we have received with regard to the management of the project has been positive – from both beneficiary businesses and wider stakeholders. The project has been seen to have been well led by Cornwall (Duchy) College as the accountable body, with the project well led through some difficulties in the early stage of the project. The Programme Director has acted on behalf of the project well and been 'visible' across the agri-tech space. In general terms, the wider partnership has worked well – with the regular project management groups acting as a useful forum for partners to work closely. The project steering group has been an important forum for project oversight and acting as a sounding board. It has good industry representation, providing valuable insight. Whilst there was some early tension as regards the role of the steering group and research partners, these eased as the project progressed. Those industry partners have shown a sustained commitment to the project through the 4+ years of the project.

Quality of delivery	The feedback from business beneficiaries in terms of all elements of the project (collaborative research, innovation grants and graduate placements) has been positive. This has been demonstrated through responses though the various phases of this evaluation. The overall project has been multi-faceted and the way (and depth) of business interactions with partners has varied on a case-by-case basis. However, there is good evidence that relationships will continue beyond the ERDF funded period, and this is part testament to the businesses being satisfied with the support provided. In broad terms, the support provided by Cornwall Development Company (innovation grants) and Unlocking Potential (graduate placement) were largely positive - with beneficiaries commenting on the support provided by the respective teams. As is often the case, some businesses felt that the innovation grant process was overly burdensome and bureaucratic. In our experience this is a comment often made with regards to any public grant programme. Clearly there is a balance between ensuring that public funding is managed appropriately with the due diligence applied whilst still ensuring that the process is responsive to business timescales. In our view, an appropriate balance was struck in the management of the innovation grant scheme.
Integration of horizontal principles	The project emphasis as it developed has increasingly taken an environmental/ low carbon focus – as it has become clear of the role that agriculture will play in helping to reduce carbon emissions (being one of the largest emitters). Several of the collaborative research projects and innovation grants have had a clear low carbon emphasis – meeting the sustainable development cross-cutting theme – although the impact of those activities may be experienced over the longer-term. Whilst not a specific focus of the project, the delivery partners all had appropriate equality and diversity processes in place to ensure that recruitment of staff was undertaken in an inclusive manner. Project activity was delivered in a way that open and inclusive to any individuals who wished to be involved in the project.
Communications and Publicity	Knowledge exchange and dissemination was seen as a key element of the project, particularly given the constraints presented by the Annex I issue. The project recognised that disseminating the outcomes of the research projects was going to be key as they emerged. The project had made some good early progress on communication and dissemination before the impact of Covid-19. This has had a significant impact on the ability of the project to disseminate important findings to a wider audience and it is probably fair to say that much of the dissemination activity did not proceed as planned. However, the programme delivered many online events which increased the scale of attendees. It is also important to note that the project exceeded its communications and publicity objectives as set out in the original GFA

ROBOTRIKS

Robotriks was an industry partner alongside the University of Plymouth through the ACP supported Robotic Harvesting research project. It is also received an Innovation Grant through ACP.

Since the end of the Robotic Harvesting project, Robotriks has been featured internationally in journals and news reports for its work on its low-cost autonomous robotic agricultural platform. The affordable nature of the platform has even resulted in other agri-tech companies swapping their developments away from building their own platforms, to instead integrating directly to Robotriks own RTU eco-system. The RTU was designed from the ground up to be a low-cost, modular platform to facilitate autonomous robotics in a farm environment.

Development has continued and Robotriks is now working closely with a number of partners to permanently deploy its platform on their fields locally around the southwest of England, before expanding further.

Since the Agri-Tech Cornwall project completed, Robotriks has received just under £100,000 of additional funding and investment to continue the autonomous agricultural platforms development. Now with the RTU.V5, manufacturing is completely in house with a new track system, and the design has been further optimized to survive difficult and harsher environments.

https://www.robotriks.co.uk/

This section reports on progress towards the ACP outcomes and impacts as set out in the Logic Model, as well as on wider questions around additionality and attribution that the Summative Assessment is required to cover. The sections cover:

- Programme objectives;
- Programme outcomes;
- Programme impacts;
- Unexpected outcomes and impacts;
- Additionality;
- Contribution to achievement of ERDF programme target indicators;
- Strategic added value.

It is useful to note that within the formative evaluation stage of this work it was noted that there was a considerable jump in the project logic model between the specified outputs, which measure the direct results of the activities and the outcomes e.g. businesses actively involved in RD&I, employment, new products developed etc.

The formative evaluation defined the outcomes at different levels – as shown in the below table – which then led to intended wider impacts. The intention was to test these different levels of outcomes through the evaluation stages – as discussed in this report.

1st level outcomes	SME awareness of opportunities and benefits of RD&I SME confidence in engaging in RD&I SME access to finance to undertake RD&I SME awareness of RD&I capabilities of research partners and other businesses Research partners' knowledge of industry RD&I needs and capabilities Enhanced levels of collaboration and knowledge exchange between businesses and knowledge partners Enhanced RD&I infrastructure (e.g. dairy systems research platform)
2nd level outcomes	SMEs actively engaged in RD&I activity SMEs engaged in development of new products SMEs engaged in development or improvement of processes SMEs engaged in collaborative R&D projects Number of staff engaged in RD&I activities RD&I spend among supported businesses Improved knowledge in priority themes
3rd level outcomes	New to firm products New to market products New processes introduced Employment in supported businesses
Impacts	Agri-tech sector RD&I spend Number of Agri-tech companies engaged in RD&I activity Agri-tech sector output Agri-tech sector employment Agri-tech sector GVA Spin off research, leading to new company formations

Programme objectives

This section reviews whether the project was able to meet the objectives as defined in the original ERDF application and accompanying logic model. We have tested this through a variety of ways – principally through our consultations and surveys with beneficiary businesses (with a quantitative focus) and wider stakeholders – including those industry representatives on the Strategic Steering Group (with more of a qualitative focus).

Increase investment in agri-tech research and innovation by SMEs

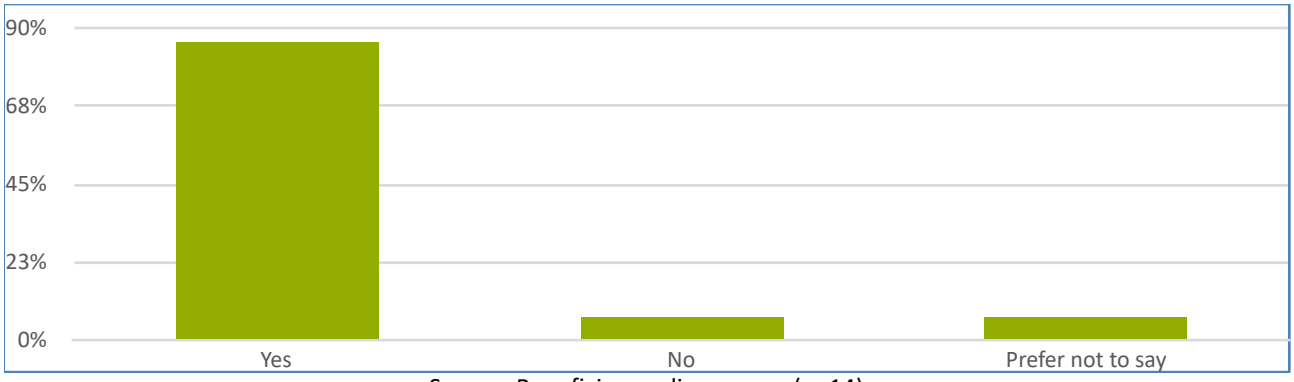
It is important to reiterate that prior to the commencement of ACP it was considered that investment in agri-tech within C&IOS was only just developing from a low base.

Firstly, the project has captured a proportion of the private investment that has been leveraged in from the innovation grant and graduate placement strands of the project. As shown in Section 3.2, the project has leveraged c£455,000 of additional private investment to date – with more expected as the final innovation grant projects complete and evidence expenditure.

Given that the ERDF programme has been set at an intervention rate which has required match funding from beneficiary organisations, it is designed to leverage this investment.

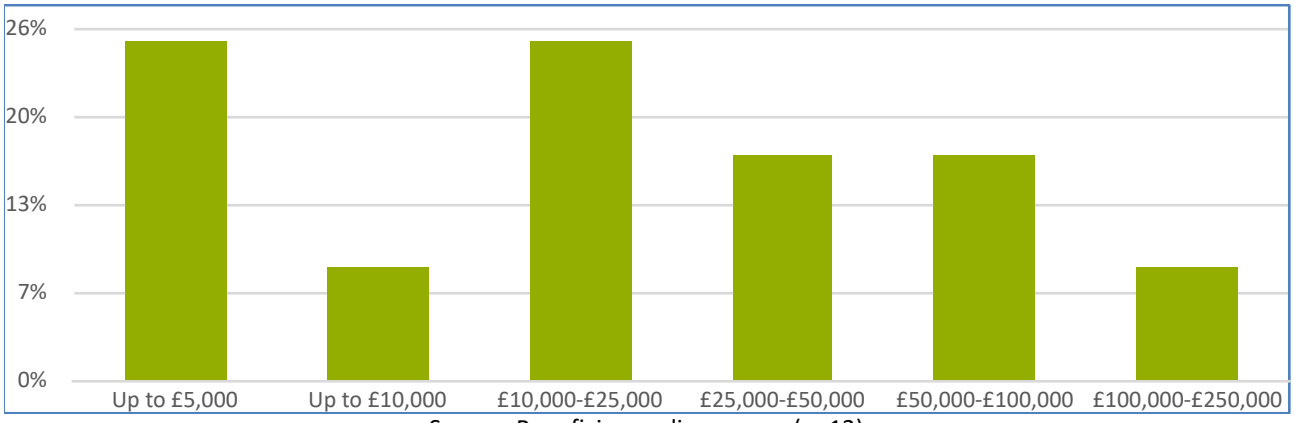
The result of the online survey provides evidence (albeit from a small sample) of the impact on investment intentions for those businesses supported through innovation grants. Chart 10 indicates that – in some instances – the subsequent investment in RD&I has been significant (£50,00-100,000+), although for the majority of those that responded, subsequent investment levels were lower. In part, this reflected the size of the businesses supported.

Chart 10: Has the support you received from the Cornwall Agri-tech programme directly led to an increase in RD&I spend within your business?



Source: Beneficiary online survey (n=14)

Chart 11: Can you estimate how much more you have spent on RD&I as a result of the project?



Source: Beneficiary online survey (n=13)

From the post project forms completed by supported businesses it is clear most saw RD&I as an ongoing process and reported plans to further develop and commercialise the products and services developed. A variety of further funding needs were identified to progress plans. This was to cover activities such as product and service development, product testing and demonstration, market research, farmer engagement, development of new premises (laboratory, training/ demonstration centre), recruitment etc.

A small number of businesses had reported that they had attracted new external private investment for further product development. Two businesses had jointly succeeded in securing R&D funding through Innovate UK grant (with two other businesses at the application stage), and another had received a BEIS SBRI Phase 1 grant.

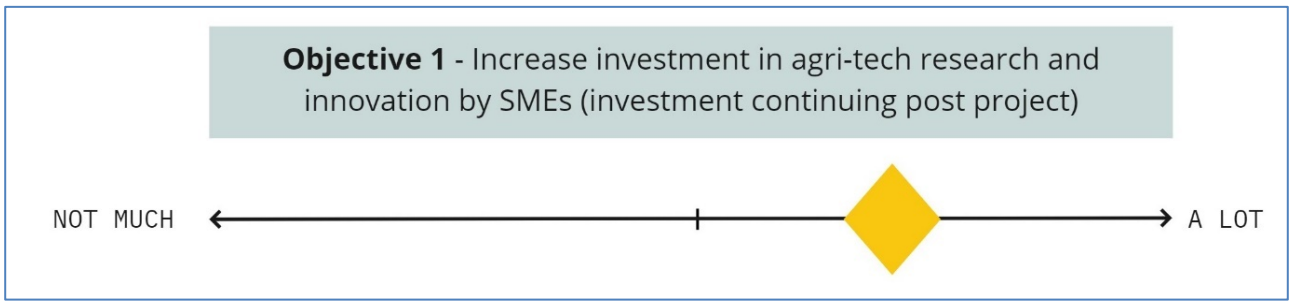
The above does not include any R&D investment that has been leveraged following collaborative research projects. Our consultations have highlighted that many have invested their own funds in response, or as a consequence, of the outcomes of the collaborative research – providing several businesses sufficient confidence in progressing their plans. As discussed elsewhere, some businesses subsequently linked through to the innovation grant scheme within the project to enable it to take those next steps.

What we cannot categorically comment on – given limited quantified evidence that we have received – is the scale of private investment that has been leveraged as a consequence of the collaborative research activity. This needs to be placed in the context of the collaborative research representing a good proportion of the overall project budget.

Therefore, whilst there is a good level of confidence that the project has leveraged private investment – and therefore has met the objective of increasing investment in agri-tech - we do not have sufficient evidence to comment on the full scale of this leveraged investment. Our expectation - informed through our consultations with businesses - is that investment is likely to grow over the coming years, as businesses further develop, test and launch new innovations.

We feel it is realistic to expect that additional investment will not be focused in only those businesses that have been assisted, with it being spread across a selection of businesses.

The views of the industry representatives on the SSG were broadly positive in how successful the project had been in stimulating additional investment in agri-tech. Some SSG members had seen evidence of subsequent investment by supported businesses. The visual below shows the broad consensus amongst SSG members with regard to this objective, although some were concerned about the sustainability of investment following the completion of the project.



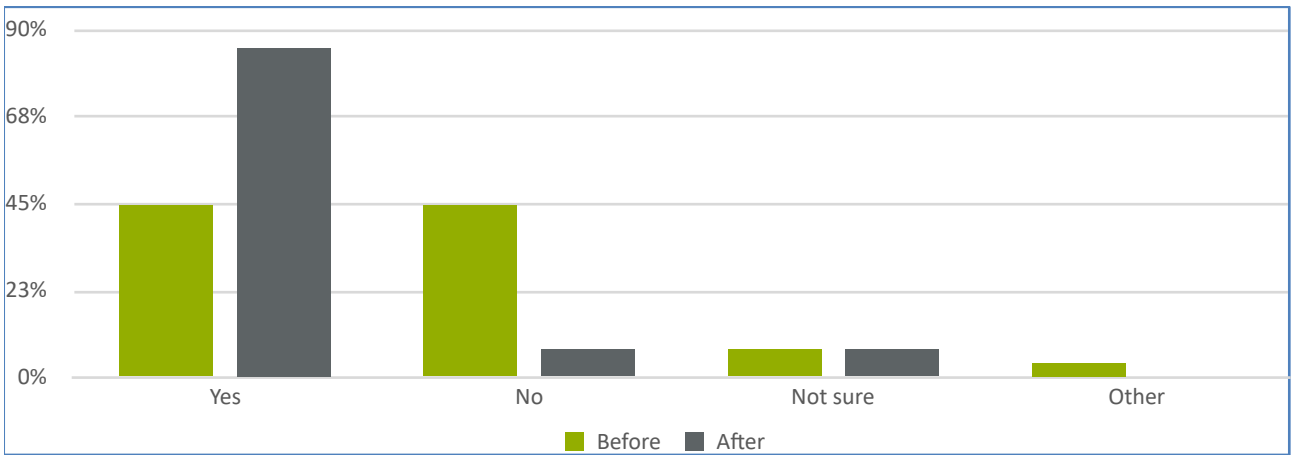
Increase the number of agri-tech SMEs engaged in knowledge exchange and collaborative research and innovation

We have a high level of confidence that the scale of SME engagement in knowledge exchange and collaborative research within the project has met original expectations. To date (end of June

2021), 86 enterprises had worked with the research partners on a range of research activities. This scale of collaboration is a significant achievement.

A key finding from this evaluation is that the project has been able to facilitate/encourage a good number of businesses to consider developing products/services for the application within agri-tech – as shown in Chart 12 which compares *before* and *after* support through the project.

Chart 12: Before or after your involvement with the Cornwall agri-tech programme did (do) you consider your business to be active within the agri-tech market

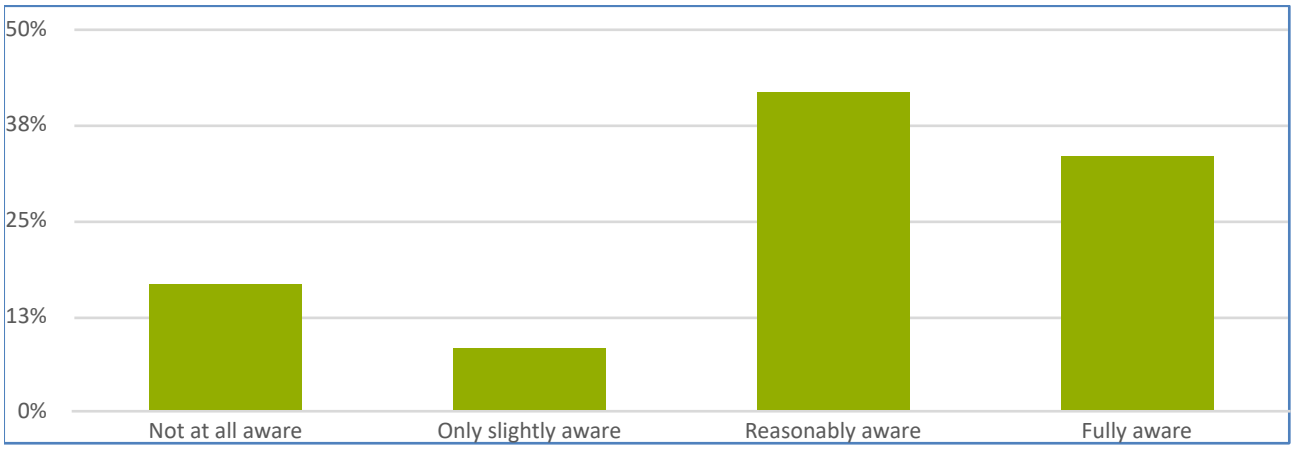


Source: Beneficiary online survey (n=27)

One of the of the objectives of the project in its early stages was to increase the awareness within businesses of opportunities for RD&I activity within agri-tech. Sitting alongside this was the intention of improving the understanding of the expertise that sits within the research partners. This formed part of the project Logic Chain (as set out earlier) – 'raising awareness of RD&I opportunities was identified as an important first step of the project.

The feedback suggests there was a mix of previous engagement/awareness from those businesses who collaborated with the research partners. For some, they had been aware of the expertise that sat within the respective research institution, whilst for others the engagement through the project had allowed them to build knowledge of that expertise and potential support – as shown in Chart 13[15].

Chart 13: Before your involvement in this research project, how aware were you of the specific expertise of the research institution?

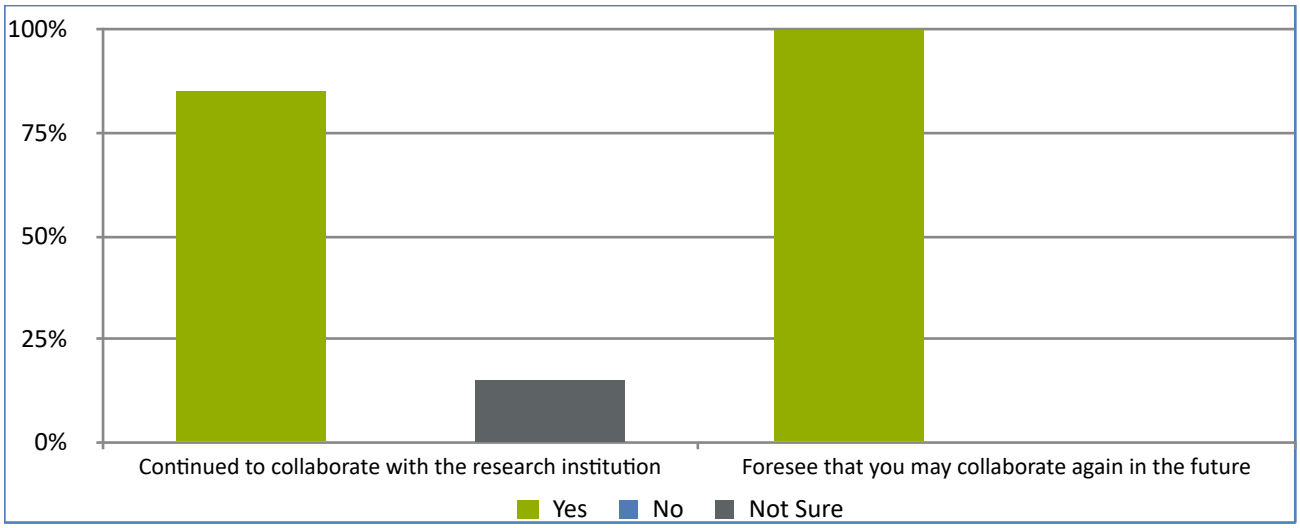


Source: Beneficiary online survey (n=12)

[15] *This feedback was taken from the initial interim evaluation report*

There are positive signs that these new relationships will continue beyond the ERDF funding.

Chart 14: Have you continued working with the research institution on other (related or unrelated) activities or do you foresee that you may collaborate again in the future?



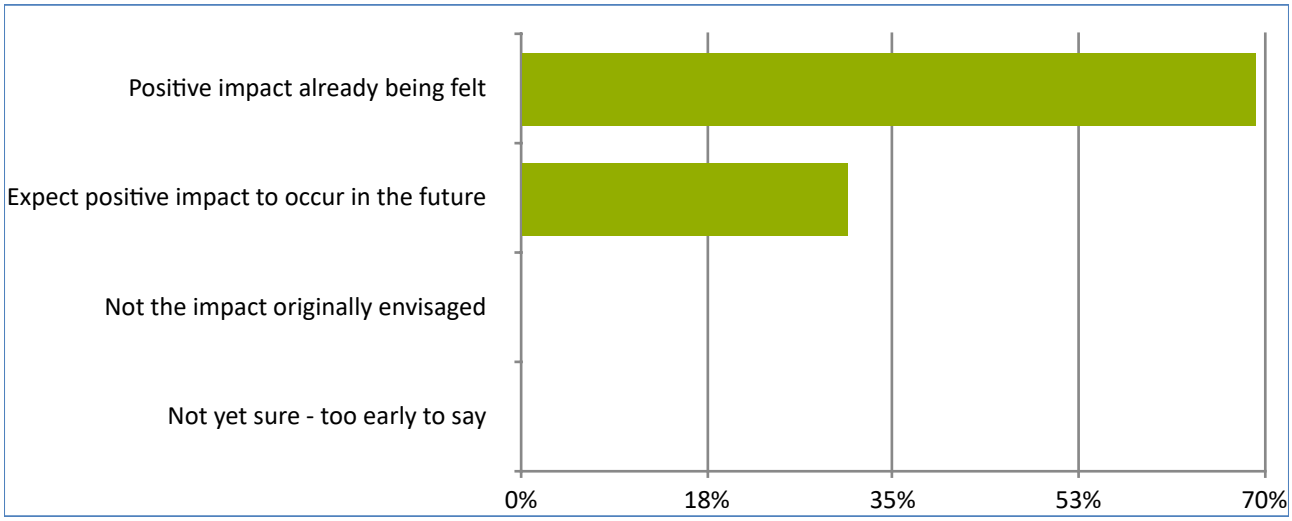
Source: Beneficiary online survey (n=14)

From a research partner's perspective, for some the project has encouraged them to establish new relationships with SMEs. Each of the research partners have different organisational objectives, and this has partly reflected the degree of their engagement with the SME community to date – particularly for non-Annex 1 businesses. Other research partners had more of a history with working with local SMEs, partly because of involvement in previous ERDF projects. This different history of SME engagement partially explains the difference in how quickly collaborative research projects were established in the early stages of the project (discussed elsewhere in this report).

The fact that ERDF funding has supported the forming of relationships between businesses and research partners should be viewed as a key success of the project to date.

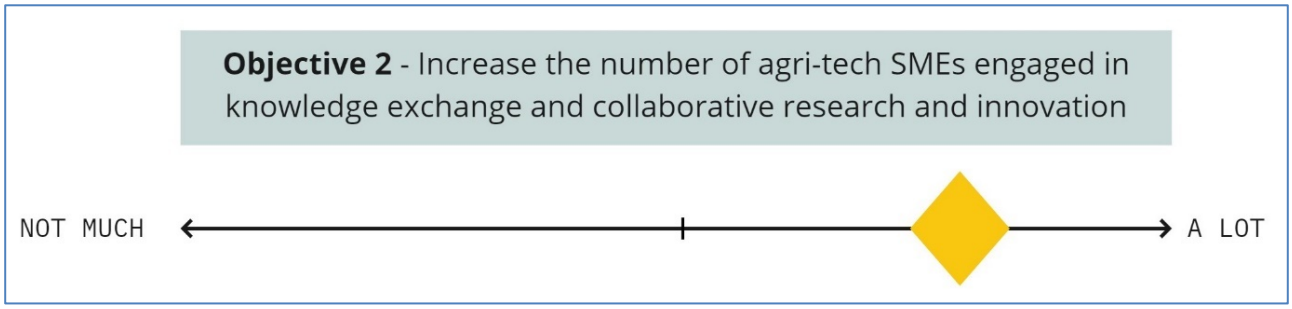
Chart 15 shows that the feedback from a sample of those businesses that have been involved in collaborative research projects is that they have – or will – have a positive impact.

Chart 15: Has your involvement in collaborative research had/having a positive impact on your business?



Source: Beneficiary online survey (n=13)

Again, the consensus amongst industry representatives on the SSG was broadly positive with regard to this objective. It was felt that one of the key benefits of the project has been that it has been able to 'shoulder some of the risk' for both SMEs and the research partners. In any sphere where stimulating innovation is a core objective, de-risking early-stage development for businesses is highly important. Overall, the industry representatives on the SSG were confident that the project had stimulated a greater number of SMEs involved in collaborative research and innovation – with the consensus illustrated by the graphic below.

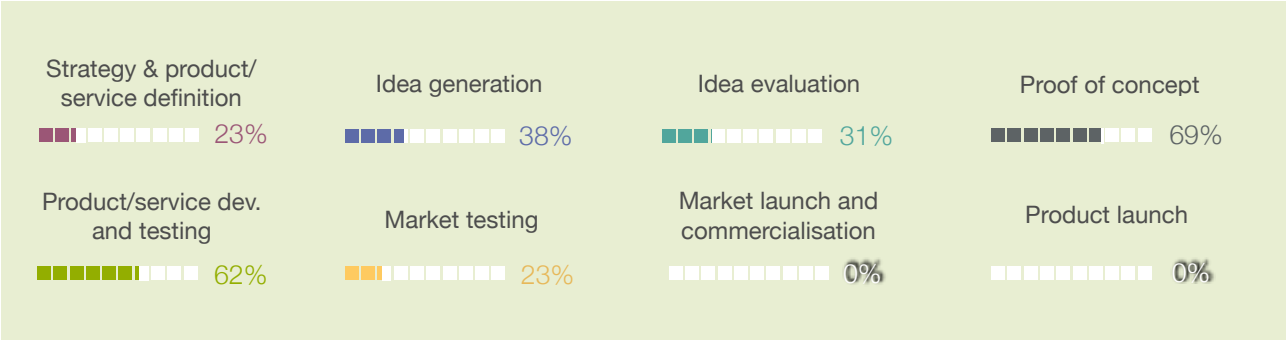


Support agri-tech SMEs to bring new products and processes to the market

The evidence relating to new product/service development by businesses that have been supported through the project is relatively strong. As shown in Section 3.2 and Annex 3, the project has been able to evidence a significant scale of new product/service development. To date (June 21), 21 businesses have evidenced 'new to market' product/service development (C28 ERDF output), whilst a further 32 have developed 'new to firm' product and/or services. The expectation is that the final achievement of these outputs will significantly exceed those expectations set out in the original Grant Funding Agreement.

It is also clear that the project has supported businesses at different stages of the product development lifecycle. In broad terms, it appears that those businesses involved in collaborative research projects were more focused on work that supported idea generation, idea evaluation and/or proof of concept with fewer being focused on launching products (as shown in Charts 17 and 18 below). These charts show responses only from those businesses who were involved in collaborative research projects.

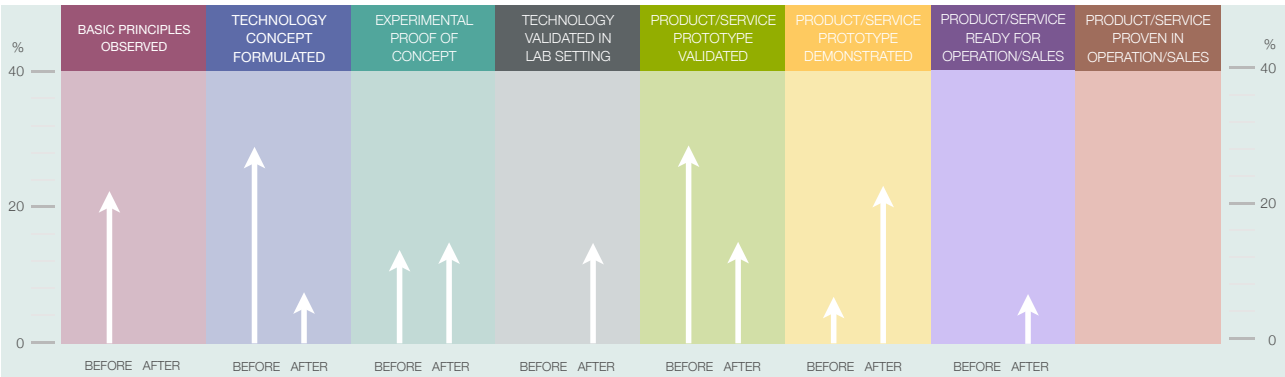
Chart 16: Did support from the Cornwall agri-tech project help you with any of the following?



Source: Beneficiary online survey (n=13)

The latter two questions illustrate a wider structural issue in both CIoS and MHCLG ESIF support - that is how to further accelerate the development of R&I businesses to the stage of securing investment and growing market share.

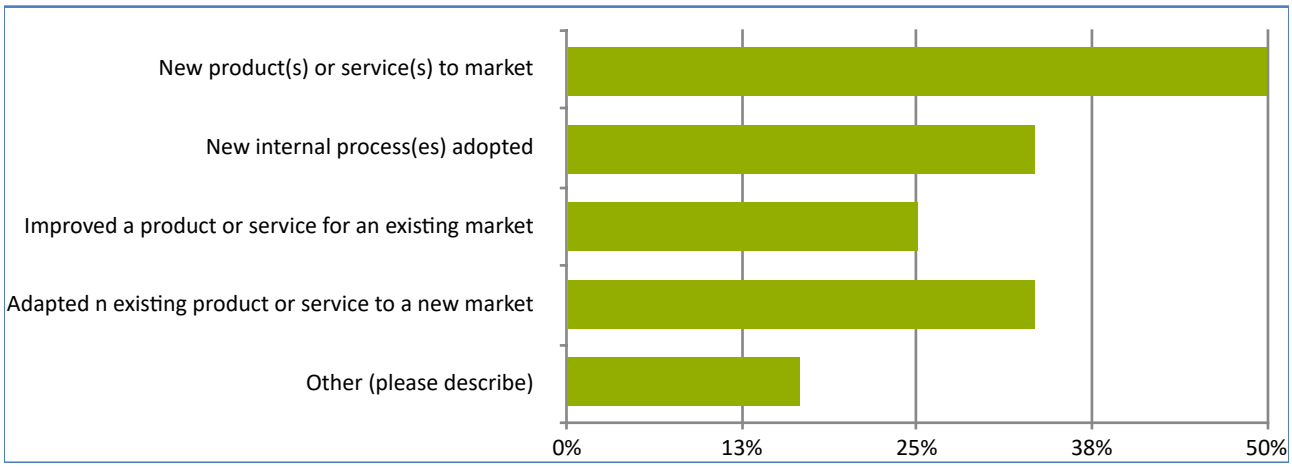
Chart 17: Thinking about the product/service that you were involved in, can to define where on the scale below you were before and after your involvement in the Cornwall agri-tech project?



Source: Beneficiary online survey (n=14)

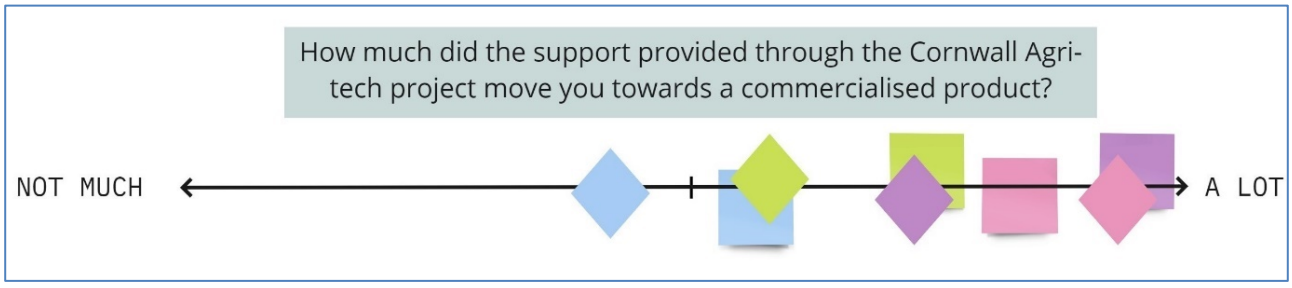
However, despite this 'early-stage' focus often found in the collaborative research projects, there is still some evidence that the collaborative research activity will still result in new product/service development by a proportion of businesses involved – as shown in Chart 18 – with broadly half of those who responded to the survey still expecting that a new product/service will be developed. The new products and/or services developed by SMEs involved in collaborative research projects are also detailed in Annex 3

Chart 18: What positive impacts are already being felt, or expected to be felt in the future?



Source: Beneficiary online survey (n=12)

We also held an online workshop with a sample of businesses who had been involved in collaborative research projects. Again, the feedback from those businesses with regard to new product/service development was relatively strong – as shown below, with most stating that the support from the project had moved them towards a commercialised product – although several highlighted that there were not at that stage yet.



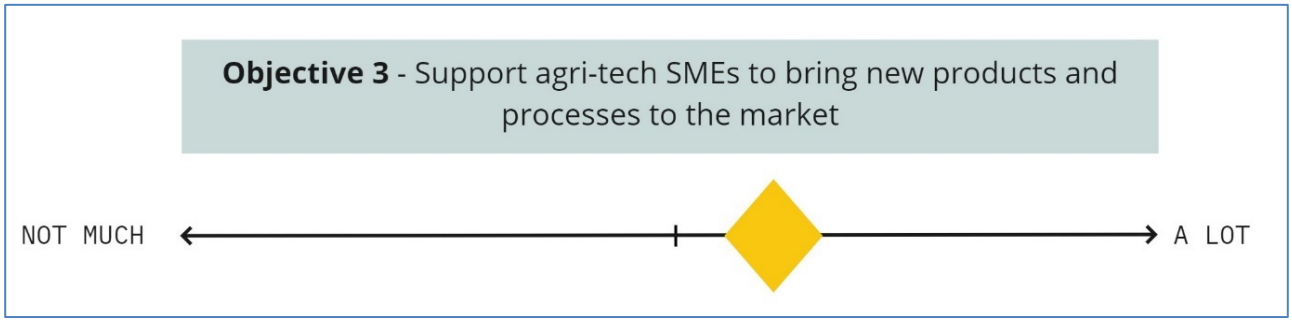
Therefore, the evidence from those businesses who had been involved in collaborative research projects represents a mix. For some, their involvement had been at the early stage of product/service development, whilst for others it has helped them move towards aspirations of a commercialised product – although for many there were still further steps to complete before reaching that stage (including the requirement for additional investment).

The evidence around new product/service development has tended to be stronger within those businesses that had been supported by innovation grants – as commented in Section 4.3.

Table 7: List of products and services developed through Innovation Grant projects

• Spray to treat lameness in dairy cattle • Bale shredder • Product for efficient application of livestock feed • Farm data management system – online user interface • Drones for crop inspection • Carbon calculator and related consultancy • Robotics for automation of farm tasks (2) • Pest control for Cabbage Stem Flea beetle in Oil Seed Rape • Virtual fence system for livestock management	• Ultrasonic system to treat waterways on farm • Web-based information tool • Blood testing (Lyme Disease) • Climate controlled aeroponic Ferris wheel growing system • Controlled growing environment for year-round growing of essential oils • Insect feed for poultry sector • Embryo transfer service • Automated control system (biochar) • Magnetic Induction Heating for Pest Control (MIHPC)

From a SSG perspective, the view on the success of the project in supporting businesses to develop new products/services was more muted – as illustrated below. This may be a consequence of members not having full visibility of the range of products/services that have been developed.

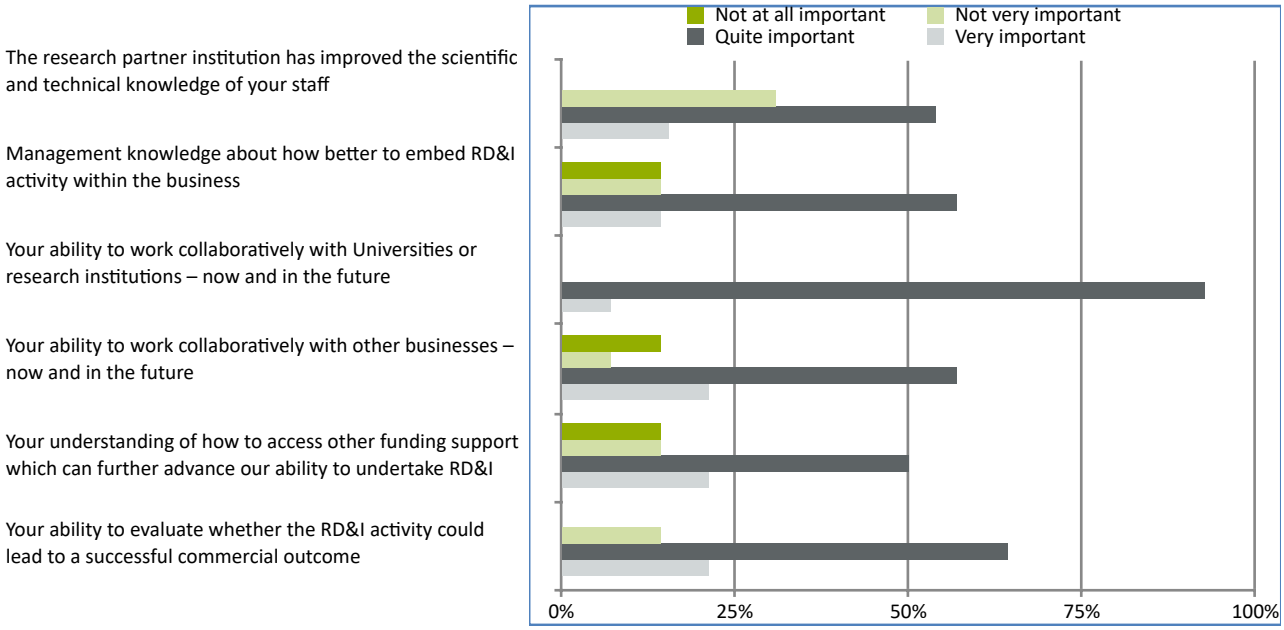


Demonstrate the benefits of working with knowledge-based partners to agri-tech SMEs

As discussed previously, there had been a mix of experience within those businesses who were involved in collaborative research projects with regard to working with the research partners. As also discussed previously, each of the research partners were coming from slightly different starting positions in terms of previous SME engagement, particularly with a CIoS focus.

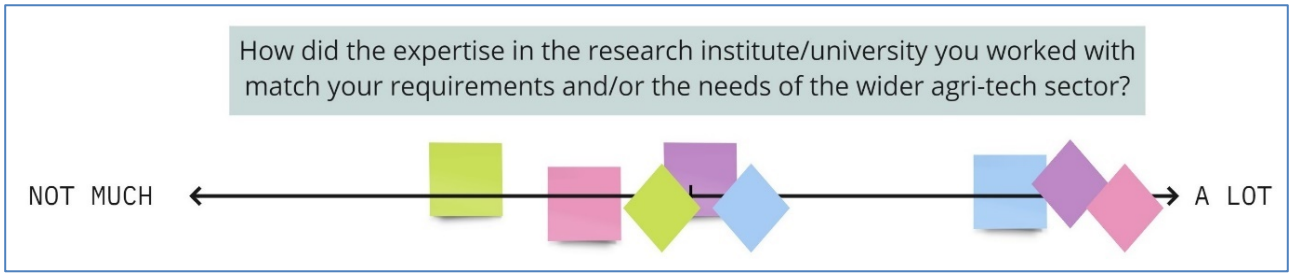
The feedback that we have received has been broadly positive. As shown in Chart 19 most businesses felt it had been 'fairly easy' to work with the research partners. It appears that the benefits of working alongside a research partner has been multi-faceted – as shown below in Chart 19.

Chart 19: How important has the support from the Cornwall agri-tech project been in improving the following factors?



Source: Beneficiary online survey (n=14)

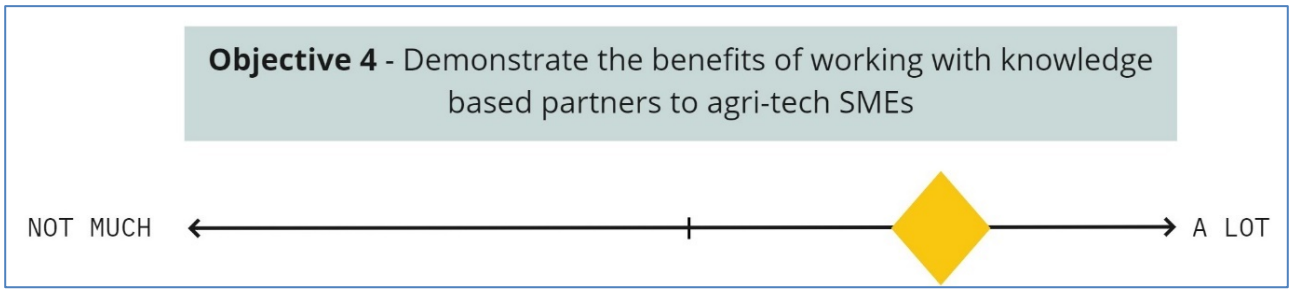
We feel it worthwhile to highlight that a third of those who responded to the survey felt that working with the research partner had not been important in improving the scientific and technical knowledge within the business. This broadly conforms to some of the evidence from our wider consultations. As shown below, in our online workshop there was mixed feedback with regard to whether the expertise within the research partner had met requirements (with a grouping in the middle of the scale), although some of those we spoke to were very positive about the expertise imparted. This may also reflect that academic research institutions often have a narrow technical and scientific focus - illustrating the importance of projects such as ACP that aim to help them better understand the needs of business.



Overall, clearly ACP has been able to facilitate many collaborations between businesses and research partners that would not have otherwise occurred in the absence of the support available. Not least, the ERDF funding support has enabled/facilitated the research partners to devote resource which would not have otherwise been possible.

From research partners' perspective, a soft outcome of their involvement in the project has been that it has allowed them to develop a greater awareness and understanding of the nascent agri-tech sector within CIoS, and the evolving needs of businesses who wish to exploit opportunities that arise. The ERDF funding has allowed them time/space/resource to develop this understanding.

With regard to this objective, the broad consensus from SSG members is shown below – with broadly positive views expressed, although some were again concerned about the sustainability of relationships beyond the project timeframe.



Conclusions - programme objectives

The following table draws our conclusions on progress towards project objectives together in the form of RAG ratings.

red = limited progress

amber = some progress

green = good progress

SA evaluation question	Comment
Increase investment in agri-tech research and innovation by SMEs	We have good evidence that the project has enabled and facilitated investment by CloS SMEs for agri-tech solutions. Directly, this has been facilitated by the innovation grant scheme – requiring matched funding to be provided by the beneficiary businesses. Indirectly, some investment has been followed-on from the collaborative research projects – although the evidence around this at this stage is weaker. Given that investment in agri-tech was starting from a low base, the project has certainly helped support the start of investment flows into the sector. However, it is worthwhile noting that several beneficiaries and stakeholders stated that much more investment is required to build momentum – particularly focusing on commercialisation/monetisation of the products/services that have been developed. There was also concern that – with the potential cessation of activities once the ACP project has completed – that this momentum might be lost, particularly given the early-stage lifecycle of many of the supported businesses.
Increase the number of agri-tech SMEs engaged in knowledge exchange and collaborative research and innovation	Given the scale of SMEs that have been involved in collaborative research projects – even withstanding the ineligibility of Annex I producers – we have good confidence that there has been good progress against this objective. The level of SME engagement through the research institutions in this space prior to the project starting was low (and uneven) and the ERDF funding has facilitated that SME engagement in collaborative research to take place. In our view, there has been more mixed results in terms of knowledge exchange beyond the project itself – with the series of dissemination/knowledge exchange events that were planned significantly impacted by Covid-19.

Support agri-tech SMEs to bring new products and processes to the market	There is firm evidence of new product/service development that has been supported through the innovation grant support. As shown, the list of new products/services is reasonably eclectic. We cannot necessarily comment whether all of these new products/services are wholly new to the market – although the business needed to evidence that to be claimed as an ERDF output. The fact that the achievement of this in ERDF output terms has far exceeded the original target should be seen as a good achievement for the project. Again, there is more mixed evidence with regards to new product/service development flowing out of the collaborative research projects – with several beneficiary businesses focusing on the early-stage of product development e.g. testing, proof of concept etc. Some of this activity has not necessarily resulted in a new product/service to date.
Demonstrate the benefits of working with knowledge-based partners to agri-tech SMEs	The beneficiary businesses we spoke to clearly saw the benefits of working with the research institutions. Some of these had prior knowledge of the expertise that sat within the research institute, and some did not. The evidence also suggests that for many businesses, there is an expectation that support through the ACP will lead onto longer-term collaboration with the relevant research institute. However, it is equally important to note that the research institute will need the mechanism (funding) to allow this to happen. The number of businesses that are in the position to provide 'paid for' research is still quite limited. In terms of whether the expertise provided by the research institute met expectations, the evidence is a little more mixed, with some businesses stating that it did not necessarily meet those expectations. Some of this was connected to ways of working i.e. academic institutions tending to work more methodically than business expectations/requirements. Overall, though – our consultations were positive.

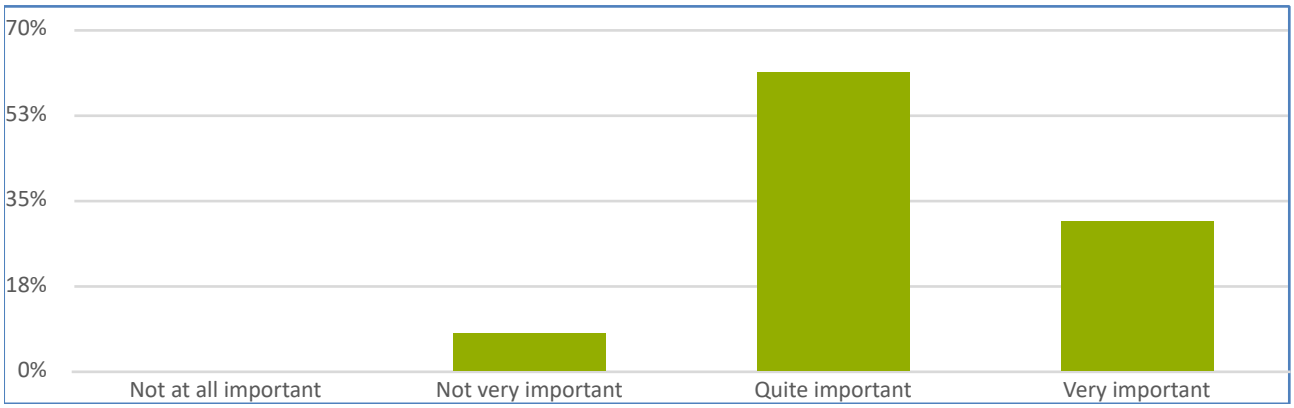
Programme outcomes

As previously discussed, in our view there was some overlap between the project objectives and outcomes – not surprisingly given outcomes are a measure of achievement of objectives. Therefore, some of the below discussion around achievement of outcomes may revisit some of the above discussion.

More business actively participating in innovation

The feedback we have received shows the important role that the various strands of the project have played in supporting businesses to innovate more (or start) in the agri-tech space. Chart 20 illustrates that the majority (although not wholly) felt their involvement with the project had been 'quite important' or 'very important' in improving their ability to innovate.

Chart 20: How important has the support been in improving your ability to innovate?



Source: Beneficiary online survey (n=13)

The stimulus for this innovation activity has been very much driven by the issues facing the agricultural sector and/or wider society. This encapsulates a range of agronomic, social and, increasingly, environmental issues. More specifically feedback from businesses cited a range of driving factors that have included:

- improving farm productivity and yields;
- pest and disease management;
- animal health;
- labour shortages/operational efficiency;
- climate change;
- antimicrobial resistance;
- challenges of seasonality;
- water management;
- reducing food miles;
- circular economy;
- livestock management/sustainable livestock feed/genetic improvements to livestock.

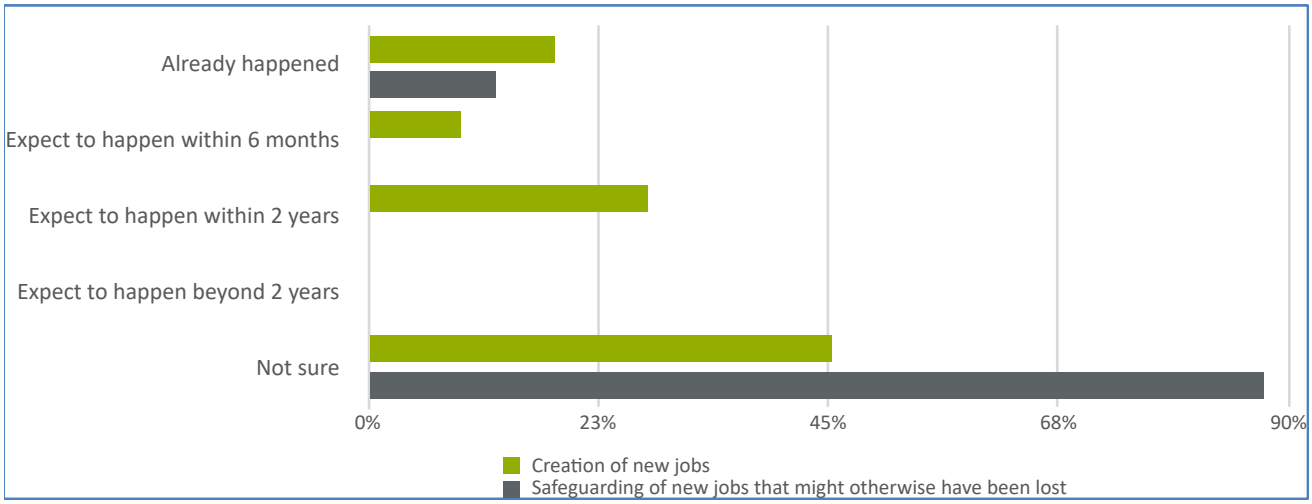
Increased direct employment

As shown previously in Section 3.2, the project has collected evidence of 17 permanent jobs that have been created through the project. A good proportion of these relate to the graduate placement strand, with many of those placements being translated into permanent positions.

Whilst it is important to recognise that job creation was not a core focus of the project – given its greater focus on stimulating innovation and early-stage research – there is some evidence of job creation through the other strands. For example, 7 of the 22 businesses who had completed their post-project reports reported increasing employment as a result of the product/service that had been developed. 5 of these businesses have taken on one FTE, 1 taking on a part-time role and 1 recruiting 2 new FTE - a total of c7.5 FTE. This equated to an average of c0.34 new FTE jobs per business across this sample of businesses supported through the innovation grant phase.

For those businesses involved in collaborative research projects, the employment impact is more mixed. Chart 21 shows that most were still uncertain of whether their involvement had led to either the creation of new jobs, or the safeguarding of existing jobs. The inference from this feedback is that the employment impact to date from the majority of businesses supported through collaborative research has been more muted.

Chart 21: Has the support you received from the Cornwall agri-tech project helped lead **to…?**



Source: Beneficiary online survey (n=12)

New to firm products

This has largely been addressed in 5.1.3, with good evidence collected by the project through its ongoing monitoring – and supplemented/corroborated by feedback through the evaluation process – that the project has been able to support 'new to firm' product/service development.

New to market products

This has largely been addressed in 5.1.4, with good evidence collected by the project through its ongoing monitoring – and supplemented/corroborated by feedback through the evaluation process – that the project has been able to support 'new to market' product/service development. We feel it pertinent to highlight that some comments were received regarding the definition of what can be considered products/services truly new to the market. In some instances, it appears more connected with the application of those products/services.

Conclusions – project outcomes

The following table draws our conclusions on progress towards project objectives together in the form of RAG ratings.

red = limited progress

amber = some progress

green = good progress

SA evaluation question	Comment
More business actively participating in innovation	As previously commented, we have good evidence that the ACP project directly facilitated a greater level of innovation within the agri-tech space. This was principally through the collaborative research and innovation grant strands. It is important to reiterate that this was starting from a low base, which was actually more undeveloped and nascent than had previously been thought. Therefore, the project has made considerable progress on stimulating innovation and supporting potential applications in agri-tech from that low starting point.

Increased direct employment	Whilst there is some good evidence that ACP has supported job creation – most notably in the graduate placement strand – it is useful to note that job creation was not a core objective of the project – as illustrated by the relatively low output target for number of new jobs created and reflecting that it was essentially an RD&I intervention. However, the project is on target to exceed those output targets (both original and those through the PCRs). We have spoken to several businesses who hosted a graduate placement, as well as several graduates themselves, and many of the initial 9-month placements have translated into permanent roles. Both the business and the graduate have been clear that the initial subsidy was helpful (if not completely core) in creating this permanent role. Several graduates we spoke to were unsure whether they would be working in Cornwall and/or within agri-tech if it were not for the support provided through ACP. On a wider basis, there is more mixed evidence of significant levels of job creation in the other strands of the project – particularly in the collaborative research. Again, this broadly fits with the 'model' within the project, with collaborative research activity focusing on early-stage development. Therefore, you would not necessarily expect significant job creation in those businesses involved in that collaborative research. Overall, it is realistic to state that job creation to date is not of a significant scale, although it has the potential to grow if the businesses achieve their growth objectives. This is reflected in the amber rating.
New to firm products	As discussed previously, there is good evidence of new product/service development that has been supported through the project – principally through the innovation grant strand.
New to market products	As above – good progress has been made on new product/service development. We cannot necessarily comment on whether all of those new products/services were wholly new to the market – although we recognise that the businesses have had to evidence that to ACP in order for the project to claim the ERDF output (C28). This RAG rating therefore reflects confidence in that evidencing through the ERDF claims process.

Programme intended impacts

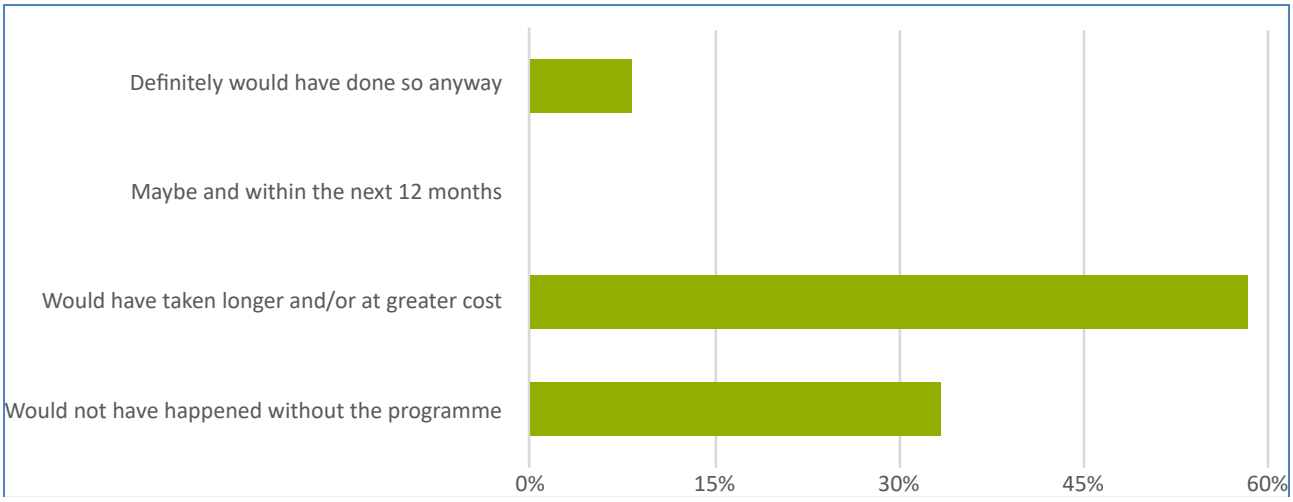
Again, as previously discussed, in our view there was some overlap between the project objectives and intended impacts. Therefore, some of the below discussion around achievement of intended impacts may revisit some of the above discussion.

Reduced barriers for SMEs engaging in Research and Innovation

Again, this has largely been discussed in 5.1.4. The ERDF funding support has facilitated research partners to engage with the SME community within CIoS. The innovation grant has directly addressed the financial aspect/barrier that many faced in progressing their research and innovation activities. In both strands, the intervention has lowered the risk to the SMEs.

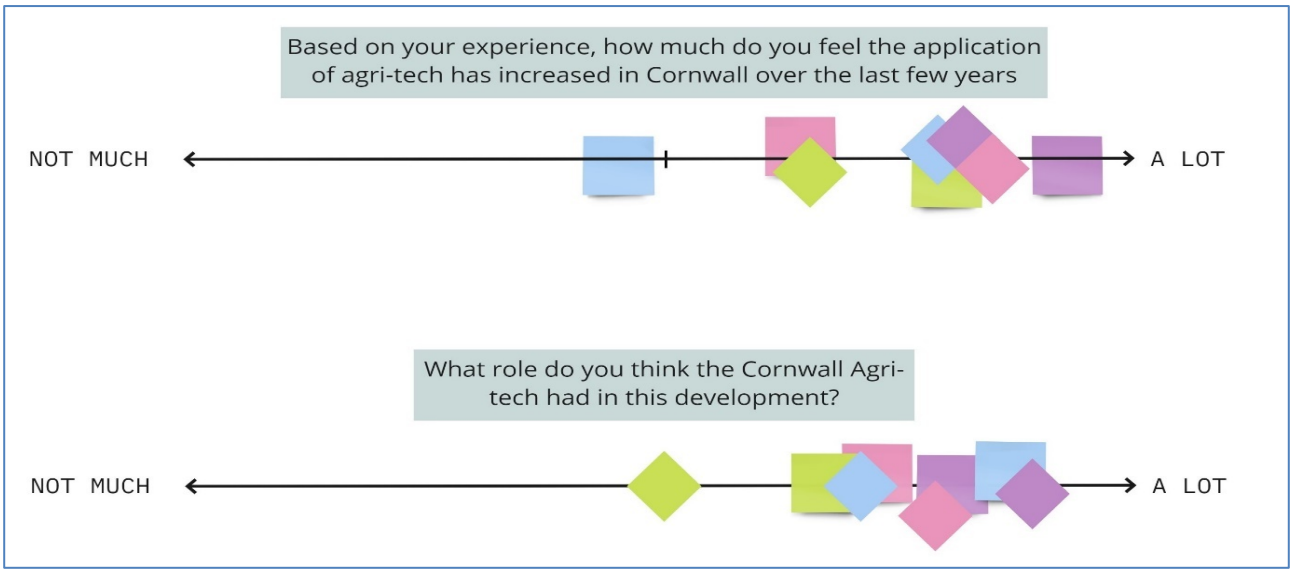
Chart 22 illustrates that there is good confidence that the support provided through the project has stimulated, or certainly quickened, activity within the agri-tech sphere. Most of those businesses who responded to the online survey indicated that it would have taken longer and/or at greater cost or would simply not have happened.

Chart 22: How likely is it that you would have undertaken these activities aimed at your target (agri-tech) market if not for the support received through the Cornwall Agri-Tech **programme?**

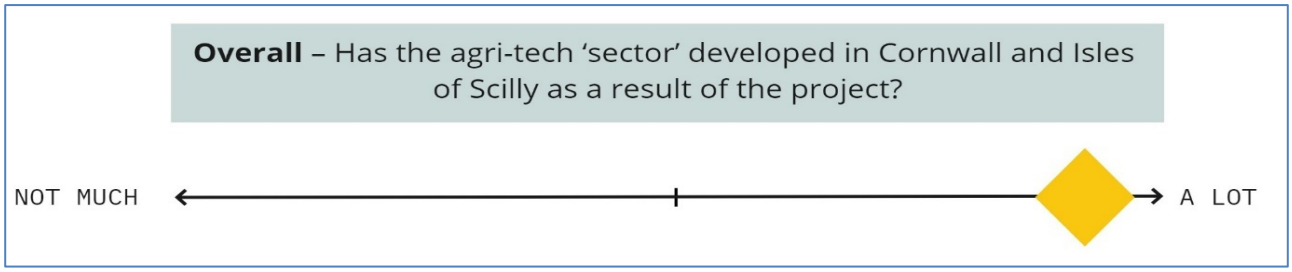


Source: Beneficiary online survey (n=12)

Overall, this was corroborated through the direct consultations held with businesses. As the below graphic illustrates, those businesses involved in the online workshop certainly felt that the application of agri-tech had increased in CIoS over the past few years and, importantly, that ACP had played an important role in this development.



In a similar vein, the industry representatives on the SSG held a broadly consistent view to the above – as also shown below (yellow diamond representing the consensus). In many respects, this is a key finding of the evaluation – good progress has been made in developing the sector from what was a relatively immature starting point.



Increased spend by Cornish SMEs and Research and Innovation

This has largely been addressed above, with evidence collected by the project through its ongoing monitoring – supplemented/corroborated by feedback through the evaluation process – that the project has been successful in stimulating and leveraging additional private investment. Our view is that will tend to have been 'skewed' in a proportion of businesses, with significant investment concentrated in a small number. The design of ERDF funding – requiring matched-funding from beneficiary businesses – has drawn through that leveraged investment. The key now is the subsequent investment that will take place – beyond the project timeframe. There are encouraging signs that some businesses are being successful in attracting follow-on investment.

New products and services being developed

Again, this has largely been discussed above with no additional comment here.

Increased understanding of industry RD&I needs by knowledge-based partners

This has largely been discussed above. The ERDF funding support has allowed many of the research partners to increase their understanding of the industry needs within agri-tech. This increase in understanding has varied across the research partners, with some coming from a more established history of SME engagement in agricultural related activity. Even within those partners, the quickly evolving nature and application of technology within agriculture has meant that the project has still played an important role in developing their understanding of the drivers behind increased demand for potential solutions. Increased environmental considerations – and therefore the need for technological solutions - has increased markedly in the project period.

As commented previously, this increased awareness of industry needs within research partners has been one of the important 'soft outcomes' of the project. Again, a key questions is whether the research partners remain engaged with businesses beyond the timeframe of this project, or whether the loss of ERDF funding to facilitate that engagement will mean that the 'disconnect' is re-established. The onus is on the partnership and individual institutions to ensure momentum is not lost, and that research partners remain connected to the business community.

Conclusions - programme impacts

The following table draws our conclusions on progress towards impacts together as a RAG rating.

red = limited progress

amber = some progress

green = good progress

SA evaluation question	Comment
Reduced barriers for SMEs engaging in Research and Innovation	The ERDF funding has clearly facilitated collaboration between businesses and research institutions. From the perspective of the businesses, direct financial assistance through the innovation grants and indirect support through the collaborative research has enabled them to undertake innovative activity. From the perspective of the research institutions, the ERDF support has enabled them to recruit into research posts and provide the dedicated resource to engage with SME businesses. Without this intervention, it is unlikely that this would have occurred – particularly for those partners who traditionally came with less history of SME engagement. Overall, we have good confidence that barriers to research and innovation have been reduced as a consequence of ACP.

Increased spend by Cornish SMEs and Research and Innovation	As discussed previously, we have good evidence that the project has enabled and facilitated investment by CloS SMEs for agri-tech solutions.
New products and services being developed	As discussed previously, we have good evidence that the project has enabled and facilitated the development of new products/services for the application into agriculture and the agri-tech market.
Increased understanding of industry research and innovation needs by knowledge-based partners	As discussed previously, the project has facilitated new relationships between SME businesses and research institutions within the region. Many of these businesses were not necessarily aware of the expertise that sat within the relevant institution, and the collaborative research activity has enabled improved insight. The curtailing of the dissemination activity due to the impact of Covid-19 has meant that this knowledge has not necessarily been spread wider than the beneficiary businesses themselves. Therefore, the project has probably not reached as wide an audience as intended at the project outset. This may limit the extent of knowledge in the wider business community with regards to the knowledge that sits within the research institutions. The project has attempted to address this through case studies, communications etc. but the more limited dissemination/knowledge exchange activity has had an impact in our view. This is reflected in the green/amber rating.

Unexpected outcomes and impacts

The obvious major unexpected impact which has affected the project has been the Covid-19 outbreak. This has impacted the beneficiaries and the programme in several ways:

- There was significant disruption to the research projects, both in an applied sense and also in terms of the subsequent dissemination activity. This had an impact on the ability of the project to meet its expected expenditure profile (as previously discussed) and, in some instances, to maintain momentum in that research activity. Given the dependence on seasonal conditions, the immediate implication of the lockdown during the early summer 2020 was that some 'in field' activity was simply not possible.
- Alongside this, many of the SME businesses were needing to deal with the significant disruption to their daily operations. As would be expected, many needed to focus on keeping their businesses afloat, rather than necessarily focusing on the collaborative research activity.
- In a similar vein, some of the activity underpinned by the innovation grants was also disrupted. This included those projects that were already in progress, but also the flow of new applications.
- There was similar disruption to the graduate placement stand of activity. Again, quite understandably most businesses were focused on operational factors and new recruitment became a lower priority. As discussed previously, the consequence of the impact on the innovation grant and graduate placement strands was that they have subsequently needed to revise down their output targets.
- In a more physical sense, there was significant temporary disruption to the construction of the Future Farm platform. On-site activity was required to stop immediately and was halted for a couple of months. In addition, there was also disruption regarding the import of some key materials and equipment and also some of the associated expertise – notably the transparent roofing, automated feed kitchen and robot - all coming from the Netherlands.

- The programme of dissemination events that had been planned through the project period was unable to be delivered in a physical face-to-face manner as originally intended. Covid-19 has had a reasonably significant impact on the extent that the project has been able to deliver its intended knowledge exchange elements and, whilst it has adjusted well to online delivery, we feel it realistic to state that this aspect of the project has been impacted. The programme of dissemination events has not been as extensive as originally planned and this constrains a key aspect of the legacy of project activity.

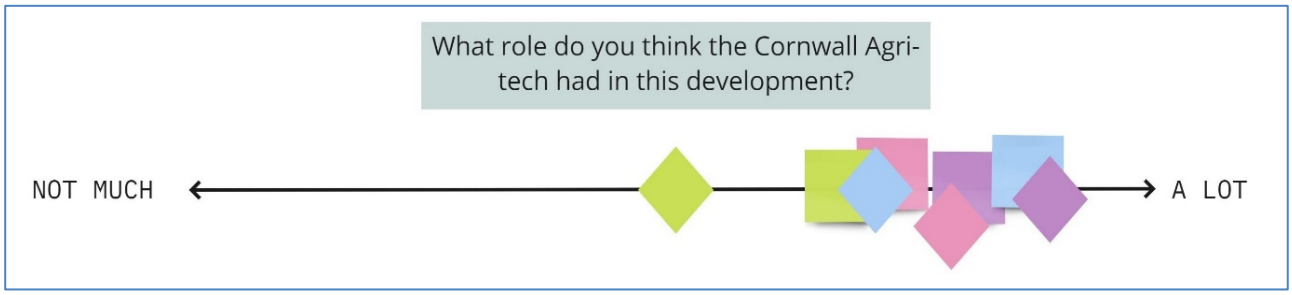
In addition to the disruption caused by Covid-19 we also feel it appropriate to reiterate the limitations caused by the inability to directly work with Annex I businesses i.e. agricultural producers. The project partners – rightly or wrongly – expected that they would be able to work with these businesses as the project concept was developed. The subsequent clarification that Annex I businesses were ineligible for support is certainly considered an 'unexpected impact' by project partners. The project had to adjust quickly to this issue and, again whilst it has done so admirably, it remain realistic to expect that the extent of positive impact delivered by the project has been constrained by the inability to directly support agricultural producers.

Additionality

There is a reasonably good level of confidence that many of the positive impacts that have been experienced by supported businesses would not have occurred in the absence of the project, or certainly would have occurred more slowly and/or at a greater cost.

One of key factors that the ERDF funding has facilitated has been the enablement of the research institutions to work directly with SMEs. Given the pressure that these institutions are under to leverage in significant levels of research income, working with micro and smaller businesses does not necessarily fit within that wider requirement. The ERDF funding that has underpinned the ACP project has brought together academic expertise and SME businesses, and there is good confidence that this would not have occurred.

In terms of quantitative and qualitative evidence regarding the additionality of the project, it is worth highlighting Chart 22. The focus on the level of additionality also formed part of our consultations with supported businesses – again, it is worth highlighting again the outcome of the online workshop with a sample of supported businesses (below).



Of those businesses we spoke to, several (although not all) were happy to attribute the positive outcomes to the support provided by the project – as demonstrated by some of the quotes below.

"The support was particularly important for early-stage business development"

"It's been the absolute catalyst to business development. It's hard to see it would have happened naturally without the support from the project"

"It's a hard question to specifically attribute to the project. However, it's likely that it would have taken longer or elsewhere – it's definitely influenced us staying in Cornwall"

In particular, the agri-tech project has been seen to address a void left by the decline of 'near market' or 'applied' agricultural research over the past couple of decades.

However, many of the businesses we spoke to also noted that there is much more work to do to continue to develop the agri-tech sector within Cornwall and elsewhere. Most noted that there remains a significant issue in commercialising/monetising those innovations that have commenced, and that many businesses struggle with this aspect. This currently acts as a constraint for the sector to develop further, or at a quicker pace. Several businesses felt that future support should be more oriented towards providing greater support around this commercialisation aspect.

Whilst this is a well-recognised important juncture in many sectors/markets, perhaps it is marked in agri-tech given the novel nature of some of the innovations and applications being developed. The problem may also be exacerbated by projected volatility in post-BREXIT UK agriculture due to the transition from a subsidy-based system to one based on payments for public goods.

Some of the below comments illustrate this need for support at this important stage of business development.

"There is no shortage of innovation activity but a shortage of skills and experience to monetise concepts"

"It feels that the agri-tech sector in Cornwall has developed but at a glacial pace – more focus needs to be on finding commercial applications"

"There is some concern over the sustainability of investments"

Gross and net benefits and attribution

As discussed previously, in many respects it has been difficult to quantify the commercial impact of the project to date. For many of those businesses we consulted, it was clear that commercialisation had not yet been reached – particularly for those businesses involved in collaborative research projects. For others, the story was more positive, and a commercial impact was beginning to materialise.

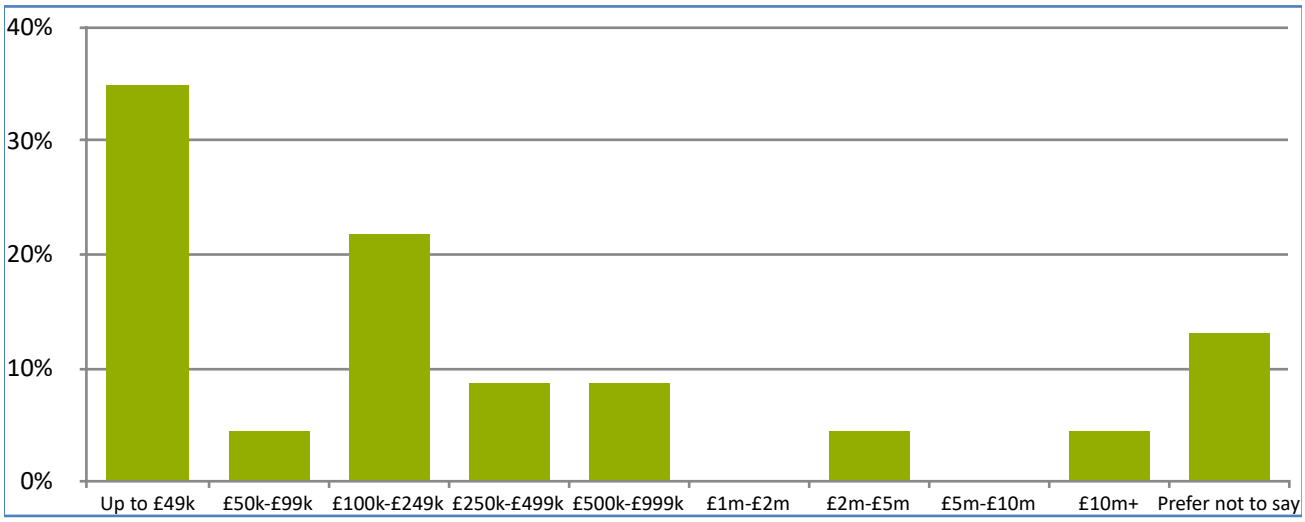
However, it is our view that the picture across all those businesses supported is likely to be highly skewed. That is, the significant quantifiable benefits (increased revenue, more jobs etc.) is likely to be concentrated in a small number of businesses.

Our view on the impact to date has been informed by the response to the online survey from a sample of those businesses who have been supported. Firstly, it is important to reiterate that this is just a sample of those businesses who have been supported. 23 businesses responded to the survey against a population of 87 businesses who had been supported at that time (and captured as an ERDF C1 output[16]) – representing c25% of those businesses that had been supported through either collaborative research, innovation grant and/or graduate placement strands. Therefore, any subsequent interpretation of the quantified impacts needs to be placed in the context of that sample response, and that we do not necessarily know whether that sample is representative of the whole supported population. As always, there is always the risk of 'positive bias' in terms of which beneficiaries respond to requests for information/feedback.

[16] *It is important to note that this number differs from the outputs shown in Section 3.2 because the survey was undertaken in late Spring and the project has been able to evidence more C1 outputs in subsequent quarterly claims*

Acknowledging that caveat, the online survey again illustrated that the greatest proportion of those businesses that had received support were relatively small businesses, many at the start of their commercial journey.

Chart 23: Are you able to indicate the size of your business in annual turnover using the bands below?

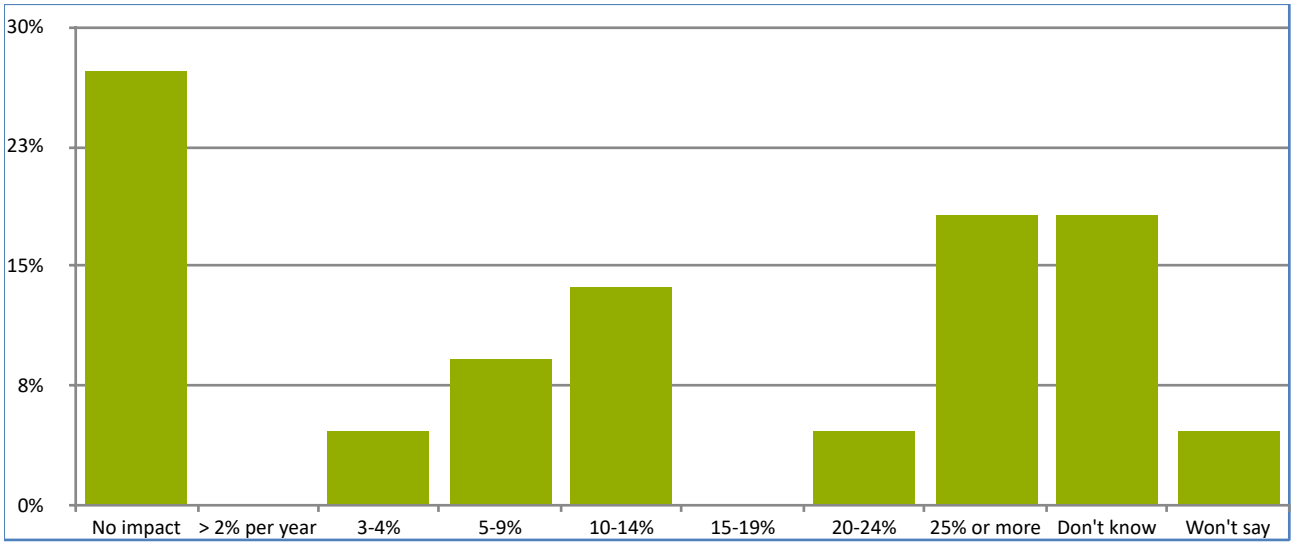


Source: Beneficiary online survey (n=23)

Those businesses were also asked about the impact that the project support had on their annual revenue – again, using banded options. The results show that for around a quarter of those who responded, no commercial/revenue impact was attributed to the project, and a proportion couldn't attribute impact or preferred not to say. This also broadly conform to an earlier question in the online survey which indicated that c60% of businesses felt that an increase in sales/revenue would only materialise in the short (next 6 months) to medium (over next two years) term.

However, for the remainder there was positive feedback in terms of the impact on annual commercial revenues, with some businesses happy to associate a reasonable proportion of their annual revenue to the project support.

Chart 24: If you have indicated that the support received from the ACP project had led to an increase in sales/revenue (either through the research project, innovation grant and/or graduate placement), what would estimate this direct impact to be (% annual revenue)?



Source: Beneficiary online survey (n=22)

Combining the results of these two questions does allow us to estimate the potential impact of the project to date in terms of commercial/revenue impact – albeit with the above caveats noted. It should be recognised that these should be viewed as high-level estimates, with a reasonable level of uncertainty. Using the mid-point of the banded options, we estimate that the median average turnover of those who responded to the survey was c£174,500. We have taken the median average because of the skewed responses – as shown in Chart 24 above.

Again, using the median average response in terms of impact of project support on annual revenue, we estimate that it typically resulted in a c7% uplift in annual revenues for those businesses that responded to the survey. On an aggregate level, across the 23 businesses who responded to the online survey – and assuming that benefits would persist for 5 years – this would equate to an additional c£1.4mn – or c£62,000 per business. We have made no assumption around the persistence, or decay, of benefit over this time period.

If we assume that the sample of businesses who responded to the survey was broadly representative – both in terms of size and impact of support – to the wider population of supported businesses (of which we can't be certain), this would equate to a revenue impact of c£6.2mn over a 5-year period. This is set out in the below table.

Table 8: Estimated impact – based on sample of responses from supported businesses

Number of businesses	Average (median) impact per business per annum	Average (median) impact per business – 5-year period	Aggregate impact – 5-year period
22 – online survey sample	£12,215	£61,075	£1,404,725
102 – number of supported businesses (C1)			£6,229,650

Clearly, this estimated impact is lower than the whole project cost of ACP. Instinctively, we feel this broadly fits with the other observations contained within this report. Primarily, it reflects that ACP has effectively been an innovation and RD&I project, supporting many businesses at the early stage of their development. As shown, many are still some steps away from commercialisation of those project concepts and therefore commercial impact at scale has not yet occurred – although the expectation is that it will occur in the future. The above approach to estimating impact does not encapsulate any future projected impact, with the question focused on impact to date.

We feel it realistic to recognise that, as with any innovation-focused activity, the benefits will tend to accrue in the longer-term. We actually view that it is a positive finding that positive commercial impact in some businesses is already occurring. As discussed, the legacy of the project – particularly in aspects such as the Future Farm platform – means it has great potential for these commercial impacts to develop over the next few years.

We would reiterate our view that – after considering all evaluation evidence as a whole (both quantitative and qualitative) – that it is realistic to expect that the initial investment has yet to be recouped in terms of commercial benefit, but it has great potential to do so over the coming years as agri-tech opportunities/applications develop.

It is also important to highlight that all the benefits of the project cannot be expressed in economic terms. In particular, the environmental benefits of many of the collaborative research projects are not reflected here – these represent a wider societal benefit which is difficult to quantify but is highly important nonetheless.

Strategic Added Value

This section reviews the main sources of Strategic Added Value (SAV) that the project has created. It relates to understanding whether ACP has created 'added value' in five different ways, extending beyond the quantitative illustration of impact highlighted elsewhere:

Leadership and catalyst

As discussed previously, several of the stakeholders that we spoke to throughout the evaluation process felt that the agri-tech as a defined 'sector' was less developed and more immature at the outset of ACP than had been envisaged when the ERDF application had been developed. There was also a lack of an identified 'leader' (either institution and/or individual) that could act on behalf of this developing sector.

As ACP has matured and developed it was felt by many that it has become a reference for agri-tech in its widest sense. The SSG – with its industry representation – has played a role in this, but principally this has been led by the Programme Director. Many of the stakeholders and delivery partners we consulted felt that the Programme Director had provided a good sense of strategic leadership on behalf of the wider sector, beyond the role he played in project delivery. The Programme Director has engaged with UK Government throughout the programme period, acting as an advocate for the opportunities that are developing in agri-tech.

As discussed throughout this report, we feel there is good evidence that the project has acted as a catalyst for many agri-tech related activities. We have good confidence that this activity is over and above what would have developed through normal market development/mechanisms.

In our view, the project has the potential to extend its influence and legacy through the Future Farm platform that is now in place (as described in Annex 3). The feedback we have received from stakeholders is that facility could play a key role in the wider development of the sector, providing an applied environment for research institutions and businesses to further test and develop solutions. The early indications are positive regarding the role that Future Farm will play in supporting further development, with a good level of business interest to date.

Influencing

It is difficult to comment on the scale of influence that the project has provided, certainly beyond CIoS. It is important to highlight that the project has operated in a period of significant uncertainty for the agricultural sector following the UK's decision to withdraw from the EU. Farmers are facing an uncertain, dynamic and volatile future following the gradual withdrawal of subsidy payments, and a greater focus on payment for public goods. There are more significant and wider changes happening in agriculture that are beyond the influence of the project per se.

In addition to this, there is now more clarity over the role that agriculture plays in climate change, with agricultural now considered a significant emitter. It will need to address this impact through more sustainable forms of farming.

What ACP has done is to continue to highlight the importance of factors such as productivity improvements, reduced environmental impact and sustained innovation – all will be important for agriculture in addressing this uncertain future. Whether it has necessarily influenced the wider agenda is not necessarily known.

Leverage

As shown in previous sections, the project has facilitated leverage at a business level. In some instances, some of the collaborative research projects are now evolving and extending beyond the ACP activity. In a few instances, this has involved the leveraging of further funding support – although certainly not yet in all cases.

Again, Future Farm has the potential to play an important role in leveraging further funding and investment into CIoS. Duchy College have already submitted several funding proposals in relation to further research at Future Farm e.g. Farming Innovation Pathways – although some of these have been unsuccessful – but there is good confidence the facility will draw in additional funding and investment over the coming years.

Synergy

As discussed previously, one of the core elements of the delivery model of ACP was to encourage joint working across research partners. As indicated, this did not develop as much as originally envisaged. Therefore, the potential for some synergies may have been lost.

Another core element was the intended link between the collaborative research activity (early-stage research) and innovation grants (near-to-market development). There is some good evidence that this worked, developing as the overall project progressed.

Given that the project involved quite separate distinct strands, whilst there was some good links between these strands it was difficult to generate synergies – either within the project or with other outside activities.

Engagement

This has been discussed throughout this report. At an individual business/research institution level, the project has clearly played a role in increasing engagement within the agri-tech sphere. We have good confidence that many businesses are engaged in agri-tech now that would not have otherwise done so.

At a more strategic level, the project has worked hard as acting as an advocate for the wider sector. Highlighting agri-tech as a solution to many of the significant factors facing agriculture over the coming decades. It has worked hard to engage with a wider audience to increase the understanding of its role. The 'Growing Back' series of webinars were a good example of the role it played in engaging with a wider audience.

Conclusions on other summative assessment questions

This section draws a conclusion in relation to other outcomes and impacts beyond those stated in the Project's Logic Model.

For this section, the key should be read as:

red = no evidence of positive impact

amber = some evidence of positive impact

green = good evidence of positive impact

SA Evaluation Question	Comment
Additionality	Our view is that there is good evidence that the support provided has been 'additional' to what would otherwise have occurred through normal market development. The business beneficiaries have indicated that their own activity would either not have occurred at all, at a much slower pace and/or at a greater cost. The combination of these factors would have resulted in a greater level of risk to those businesses, curtailing the scale of activity. Through the evidence we collected, and the discussions with businesses through the evaluation process, we have confidence that the support provided has a high level of 'additionality'.
Strategic Added Value	The project has been delivered in a dynamic and volatile period of UK agriculture, following BREXIT and the significant subsequent changes to agricultural policy. The impact of these changes is still uncertain at this stage. Therefore, the strategic influence of the project may have been curtailed slightly by this dynamic wider environment. This was further complicated by the disruption caused by Covid-19, with the intended series of dissemination and knowledge exchange events being reduced. Whilst the project – and in particular the Programme Director – has acted well as an advocate for the 'sector', it is difficult to fully comment on the influence that the project has had beyond CloS. The establishment of Future Farm does provide the potential for influence to be continued and extended, with it attracting interest from businesses and policy makers alike. Overall, we feel the project has provided 'softer' outcomes that cannot be captured through the quantitative evidence – and done so in difficult circumstances. Not least, the project started from a lower base than had previously been envisaged and had to work hard at developing visibility and momentum for the agri-tech sector. We feel it has done a good job in those circumstances. A key question is whether that visibility and momentum will be able to be maintained once the project finishes. The uncertainty in relation to that wider strategic influence and the legacy of that influence is therefore reflected in an amber rating.

This Section looks at the question of value for money (VfM) in both a quantitative and qualitative sense.

Quantitative Assessment of Value for Money

As with any RD&I and innovation focused activity, the timing of considering value-for-money is always important. The evidence shows that the positive impact from such interventions tends to be lagged, often considerably so, and certainly beyond the timeframe of the delivery period. We feel it important to provide that context before discussing the value-for-money of ACP.

As shown in various sections earlier in this report, there is mixed picture in terms of commercial impact across those businesses that have been supported – both in terms of whether positive commercial benefit will be realistically achieved and/or the timing of that impact. Several businesses do expect a positive impact, but it has not yet occurred. Throughout the evaluation process – through the interim and final stages – we have asked businesses about the expected timing of commercial impact.

Certainly, at the interim phases we asked businesses when they expected commercial impact and the broad response was that 'it was too early to say'. We asked the same question again in the final evaluation and whilst several businesses indicated that a positive commercial impact had occurred, many still felt it would occur over a short-to-medium term timeframe.

This means that in quantitative terms the impact that we have captured to date – primarily based on a sample of businesses – is still developing. As shown in Section 5.6 it is our expectation that impact – as measured by additional turnover and/or Gross Value Added – has not yet reached the levels of public funding invested in ACP to date. However, it has the potential to do so over the coming years.

As stated previously, it is our view that this outcome is not unexpected at this stage of an RD&I focused project. It is also useful to also point out that a good proportion (c15%) of the project budget was capital investment in Future Farm which has only become operational in the past 6-9 months. The economic (and social and environmental) benefits from Future Farm will only be realised over the coming years.

In terms of job creation, again it is important to note that job creation was not a core objective of ACP – reflecting its RD&I and innovation focus. Therefore, in our view it is not necessarily a good or appropriate measure of the value-for-money of the project. As shown in Section 3.2, the project has evidenced 17 new jobs created to date, with the expectation that this may reach 19 by the project end. In our evaluation activity, we have picked up some job creation in those businesses we consulted – although we feel it is broadly at the scale of the evidenced outputs[17].

Clearly, when placed against the c£11.8mn total cost, the project appears relatively costly if assessed on a 'cost per job' basis, particularly if placed against comparable benchmarks. For example, Regeneris Consulting undertook research to inform a series of benchmarks for the proposed 2014-2020 ERDF programme which was based on historical data from DCLG (as was) from the 2007-2014 programme[18]. This work estimated that the average (mean) 'cost per job' in the previous ERDF programme (07-14) was estimated £71,000 (with the median average being lower at £25,700). This is far below the 'cost per job' of ACP as it stands.

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[17] Recognising that some of the businesses who responded to the online survey may have already been captured in the output figures

[18] England ERDF programme 2014-2020: Output Unit Costs and Definitions. A final report by Regeneris Consulting

Similarly, the cost average 'cost per enterprise' (C1) supported of £34,000 is again significantly lower than the 'cost per enterprise assisted' for ACP – which we estimate to be c£116,000 (based on 102 enterprises assisted to date).

On most measures – if compared against available benchmark data (which admittedly is relatively old) – the ACP project appears relatively costly based on outcomes to date.

However, we feel that any measurement of value-for-money for ACP is fraught with difficulty because of several factors:

- Clearly the Managing Authority's expectations of value-for-money in terms of output delivery was established through the original funding agreement. The fact that the project has exceeded the number of enterprises supported and jobs created means that vfm has exceeded those original expectations - as set out in the Funding Agreement.
- The RD&I focused activity which means that the full commercial extent of the project has yet to mature (as discussed above).
- The nascent nature of the market/sector, meaning that more investment has been required than first envisaged to develop interest and opportunities in the sector.
- The inability to work directly with agricultural producers – meaning that the scope to fully exploit commercial opportunities was more constrained than originally envisaged.
- That the key asset – Future Farm – has only just commenced in an operational sense and future benefits are expected to flow – but not reflected in any impact to date.
- That the impact of ACP extends far wider than economic/commercial benefits. In particular, the environmental impact of the various projects – particularly some of the collaborative research projects – have not been captured in a quantifiable sense.

Qualitative Assessment of Value for Money

In our view – and this has been reflected through our stakeholder consultations which have included the industry view – the benefit of ACP has been its role in helping to develop the nascent agri-tech sector over the past few years and, importantly, developing a focus for activity. It has also highlighted the opportunities that are contained within the broad sphere of applying technological solutions to the myriad of issues that do, and will, face agriculture over the coming years.

Whilst this impact cannot yet be captured in quantitative terms this is highly important, particularly for an area such as CIoS in which farming remains highly important (from both an economic and social perspective) but also has an increasing focus on reducing the environmental and carbon impacts – so-called 'clean growth'. Technology will be key in ensuring that the environmental impact of agricultural production is reduced, whilst at the same time ensuring that it remains a viable, productive and profitable part of the economy and society.

In many respects, these are highly significant structural problems that will need addressing and the ACP can only have been one part of that addressing those issues. However, the feedback we have received indicates that it has played an important role in making a start.

It is difficult to express this in terms of value-for-money. The benefits are quite intangible.

It is also important to reiterate the point that it started from a relatively 'immature' point. Therefore, it has required a reasonable level of investment to gain sufficient momentum. A smaller scale of activity/investment would probably not been sufficient to start this development.

Finally, we also feel appropriate to highlight our view that not all the activity within the project will necessarily result in a positive outcome or wider economic benefit. Specifically, at this stage it is not clear that there is necessarily a 'pathway' for all of activities supported through the collaborative research projects to end in a commercial application.

This may be a normal outcome for an RD&I programme, given that any innovation activity is associated with risk in terms of eventual outcome. It is the essence of research, especially at proof of concept/testing stage of development. However, it does provide implications in terms of the extent of (or certainly the perception) the value-for-money of the investment. We feel it pertinent to highlight that not all activities funded through ACP will necessarily result in what could be regarded as a commercialised outcome.

Conclusions

This section draws a conclusion in relation to the overall SA question of value for money and cost effectiveness and in the light of intended and unintended outcomes and impacts. For this section, the key should be read as:

red = poor

amber = positive impact but with some uncertainty over the extent in the longer term

green = positive impact and with greater certainty over the extent in the long-term

SA evaluation question	Comment
Quantitative value-for-money	The evaluation evidence suggests that as a result of the support provided by ACP several businesses have experienced a positive commercial impact – resulting in increased turnover/profitability and associated additional employment. In some cases, the impact of the support has been highly positive and transformational. However, the evidence suggests that this positive commercial impact is concentrated in a proportion of supported businesses and not necessarily all of those supported. Equally, many businesses expect the positive benefits to develop over the coming years – a lagged impact from their involvement. Consequently, we feel it realistic to expect that the positive commercial/economic benefits may not yet have reached the investment into the project. We have reasonable confidence that it will, but there is still some uncertainty at this stage. This is reflected in the amber rating.
Qualitative value-for-money	As above, the feedback from stakeholders and industry representatives – alongside the beneficiary businesses – is that ACP has played a fundamental role in developing a nascent sector and highlighting the opportunities to businesses of technological solutions for agriculture. It has become the 'face' of agri-tech within CIoS and beyond – playing an important role across the wider South West. This leadership role is difficult to capture in a quantitative sense, but is important, nonetheless. It has required investment at a sufficient scale to create the momentum that was required. However, the key question is how this momentum is maintained once the project completes. In many senses, that momentum will need to be maintained to 'extract' the full value-for-money of the funding invested in ACP. Due to several dependencies and uncertainty over the pathway to the next steps (at both an ACP level and individual projects within), we feel appropriate to give this an amber rating at this stage.

recommendations for the ACP team and wider Steering Group. Given the programme is now ending, these recommendations now relate to how the programme considers moving forward.

Conclusions

Overall, this evaluation has found that the ACP has been regarded as a well-managed and delivered project that has played a key role in developing the role that agri-tech can play in helping agriculture have a more sustainable future – from both a financial and environmental perspective.

The delivery model – encapsulating several strands including collaborative research, direct financial support through innovation grants, a graduate placement scheme, dissemination and knowledge exchange and the establishment of the Future farm dairy facility – has been multi-faceted. Each element has addressed some of the key requirements of a developing 'sector'.

As an RD&I project that we have good confidence that it has directly helped to stimulate greater levels of research and innovation within CIoS. It has directly responded to ERDF Priority Axis One (Promoting Research and Innovation) and we have good confidence that it has contributed to the sub-priorities of Priority 1b:

- promoting business investment in Research & Investment (R&I);
- developing links and synergies between enterprises, research and development centres and the Higher Education sector;
- supporting technological and applied research.

Overall, the delivery partnership has worked effectively. The project was successful in bringing together the key research institutes across the region and the ERDF funding facilitated these research institutes to work directly with SMEs. The scale of SME engagement has been significant, and there are indications that the relationship between the research partner and collaborative business will continue beyond the project. In other instances, further funding/investment will be required to sustain this activity (see below).

We briefly discuss our conclusions from each section of the Summative Assessment report and draw out key learning by section where appropriate.

Programme Context

In our view, the wider economic, environmental and associated policy changes that have taken place since the project started has strengthened the original justification for the type of intervention ACP has involved. In broad terms the two primary influencing factors have been:

- The implications of BREXIT and specifically the UK's withdrawal from the Common Agricultural Policy, with a shift in subsidy payments to one which will be based more on payment for public goods. The need for agricultural producers to be more productive, whilst limiting their environmental impact has become more important.
- The greater understanding and awareness of agricultures impact on climate change and carbon emissions. This has increased focus on solutions to reduce this environmental impact.

We feel that the evaluation evidence from ACP – combined with the review of the policy, socioeconomic and environmental landscape at present – suggests that the importance of continuing activities that support the development of agri-tech is now actually more pressing than at the outset of ACP. *This is a key learning for policy makers.* As discussed above, in our view the combined impact of the withdrawal from the EU CAP and the greater awareness of the environmental impact of agriculture provides an ever greater justification for continued public support.

Programme targets

The achievement of output targets has been quite a dynamic situation over the lifetime of the project. There have been several explanatory factors which included a relatively slow start due to recruitment into research posts, the process of identifying eligible SMEs (and from a smaller pool than originally envisaged), the need to stimulate interest in the innovation grant and graduate placement strands, the time taken to defray and evidence expenditure etc.

Consequently, the project has submitted some Project Change Requests which have changed the output targets over time. The project partnership has worked hard to meet those output targets approved and, in several instances, a significant scale of delivery has now occurred.

For example, the project is expected to significantly exceed the output targets as defined in the original Grant Funding Agreement for C1 (number of enterprises assisted), C5 (new enterprises supported), C6 (private investment leveraged), C26 (enterprises cooperating with research institutes), C28 (new to market products), and C29 (new to firm products).

Throughout the evaluation process the achievement of ERDF output C2 (enterprises receiving financial assistance) has remained under some pressure. This was further complicated by the impact of Covid-19, particularly for businesses to be able to take on a graduate placement. The downward revision in the latest PCR allowed a more achievable target that has taken into context the difficulties presented by Covid-19.

The commencement and build-out of the Future Farm dairy facility has been associated with difficulties through the project period. Initially the delivery of this key delivery was complicated by the financial position of the delivery body. Latterly, the construction was disrupted by the restrictions associated with Covid-19. However, Duchy College (and the programme director) and the project partners remained committed to delivering Future Farm and was able to complete construction in 2020.

Programme ***delivery and management***

The project has been well managed by Duchy College and led well by the Programme Director. It was worked diligently in ensuring that the project has met its contractual targets as well as providing a good level of strategic leadership. It worked hard at the outset of the project on behalf of the project partnership in seeking clarity on several fundamental matters and has provided commitment and momentum to the project when it has faced some difficult challenges. Included in this is the successful delivery of Future Farm, and continued delivery through Covid-19.

The Strategic Steering Group has acted as a good sounding board and source of advice and guidance for the project, as well as reviewing the collaborative research proposals as they came through. It is relevant to highlight that there was some tension between this role and some of the research delivery partners in the early stage of the project. This was largely resolved or managed as the project progressed.

The delivery partnership has worked effectively. Again, the Programme Management Group has been an effective forum in which partners were able to come together regularly to discuss progress and any issues. At an individual/personal level it was useful.

At times throughout the project there was some issues with regards to Duchy College acting as both a research partner and the managing organisation. This was particularly relevant when research collaboration proposals were being brought forward at the start of the project. Whilst the Programme Director worked professionally, he was sometimes places in an awkward position fulfilling both roles. In our view in hindsight it would have been beneficial that a separate individual could have represented the research interests for Duchy as a research partner, allowing the Programme Director to clearly focus on the management of the overall project. ***This is a useful lesson for Duchy College as the delivery body.***

Again, it is relevant to highlight that at times it was apparent that each of the research institutions came into the project from different cultural and organisational perspectives, particularly with regards to historical engagement with SMEs and academic experience of engaging with SMEs in an applied research environment. This resulted in a different 'pace' at the start of the project in some cases. This may have been helped if there had some central resource that would have driven much of the early business engagement activity through the project. This may have helped coordinate activity in a more efficient manner. ***We feel that this is a key lesson for those designing and implementing similar multi-partner interventions.***

We feel that the involvement of Cornwall Development Company and Unlocking Potential as delivery partners for the innovation grant and graduate placement strands of the project have been helpful. They have been able to bring their previous experience to the benefit of ACP.

Overall, the feedback we have received from beneficiary businesses has been positive. Where there have been any negative comments they tended to relate to pace. For the collaborative research projects, this related to differences in the timeline between commercial requirements and the academic need for robustness. In terms of the innovation grants, this related to the speed of the appraisal and approval process. However, in our view we feel this was well managed by CDC – particularly given they were responsible for ensuring public money is invested in a diligent and appropriate manner.

Programme outcomes and impact

The ACP has the potential to make a significant difference to the development of agri-tech within CIoS, and possibly beyond. As discussed throughout this report, the project aimed to develop a 'sector' (with all the problems with how to exactly define that) from a low starting point. Based on the feedback from a range of stakeholders and businesses, there is a consistent view that the application of agri-tech and the opportunities that are arising has developed over the past few years. Equally, most felt that ACP had played an important role in that.

However, it is also important to recognise that the project was effectively an RD&I intervention and that, in many instances, support was provided to businesses that were at an early stage of their development. This was particularly the case for several businesses involved in the collaborative research projects. Consequently, the commercial impact to date has been mixed across the beneficiary businesses. It is perhaps realistic to expect that for some businesses there will be a minimal/negligible commercial impact. However, there are other examples where quite clearly the support provided through the project could have a transformational impact on those businesses. As with most RD&I interventions, it is likely that most of the positive commercial

impact will occur in a small proportion of the businesses supported. This is the risk implicit in such interventions and, indeed, provides the original justification for the investment and activity.

The industry representatives and businesses we spoke to felt that the potential withdrawal of support once the project completes at the end of December 21 could result in a loss of momentum at an important juncture. Specifically, many businesses felt there was an absence of support to help them move towards commercialising/monetising their products/services. This may impact the legacy, or potential, to fully deliver sustained impact. ***Again, we feel this is an important lesson for policy makers in terms of any future focus for ongoing support.***

The feedback we have received also highlights the potentially highly important role that Future Farm will play in delivering sustained impact over several years. At this stage, the early signs are encouraging – with the facility gathering interest from a wide range of businesses and collaborators. However, it is too early to capture this in quantitative terms.

In our view it is also important to recognise that the impact of the project's activities will extend far beyond the commercial/economic impact. Clearly, many of the collaborative research projects – and several of the projects supported through the innovation grants – are attempting to address and alleviate the environmental impact of farming and agricultural production. Therefore the potential impact will include these environmental and carbon benefits, which could potentially be more significant in societal terms.

Value for Money

The value-for-money of ACP is difficult to capture fully in a quantitative sense because its impacts are still developing, both at a project level and within many of the individual businesses that have been supported. Clearly, if you measure the project using 'traditional' measures such as 'cost per job', it appears a relatively costly intervention. However, it is important to note that it never had significant job creation at its core (as reflected in its job output targets) – recognising that it was intended to be an early-stage RD&I intervention.

The quantitative evidence that we have collected from a sample of those businesses that have been supported suggests that a positive commercial impact is occurring in several – although not all – and that it is beginning to provide a 'return' against the public investment in terms of additional turnover/commercial revenue. However, our overall view (albeit based only on a sample of businesses supported) is that at this stage the commercial impact has yet to reach level of investment made but has the potential to significantly over the coming years. Future Farm has a potentially important role in driving future impact. The impact from Future Farm has not been reflected in any impact to date.

There is a good level of confidence from the feedback we have received from businesses that the 'additionality' of the support provided has been high. The majority felt that the development of the agri-tech sector in CIoS would not have happened at the same scale or pace over the last few years with the support of ACP to drive momentum.

From a qualitative sense, the majority of stakeholders and industry representatives felt that the project has provided important impetus to the development of the sector – although this is difficult to quantify. Whilst stakeholders couldn't necessarily comment on whether the project had provided value-for-money, they did feel that investment had to be at a scale where that impetus was provided. A smaller-scale intervention may not have had the necessary weight to stimulate innovation activity at scale within this space.

Recommendations

Whilst the ACP project is nearing the completion – and therefore the scope for any changes in delivery are now not possible or practical – we feel it useful to highlight a few 'strategic' recommendations:

- It is clear through the consultations held that many stakeholders, industry representatives and businesses feel that the withdrawal of support through ACP is happening at quite a key moment. The upcoming post-CAP impact of the switch from subsidy-based payments to payment for public goods is expected to result in a dynamic and potentially volatile environment for farmers. Technological applications offer a range of potential solutions and tools for farmers to transition into that 'new world' – but further support is required for businesses to undertake the necessary RD&I to develop those solutions. For many small businesses the implicit risk in RD&I activity remains, and therefore public support is still justified.
- Similarly, the growing understanding of the environmental impact of agricultural production means that a greater focus on reducing that environmental impact is required. Again, technology will be a key enabler in that task. The ACP has supported a range of activities that have made a start in addressing some of those environmental concerns. Again, we feel that continued support is important to allow the development of technological solutions to the significant environmental issues facing the sector underpin the justification for public intervention.
- Clearly the inability of directly supporting agricultural producers (Annex I) did present a constraint on ACP. Given the ending of the EU Structural programmes in the UK, any future public programme aimed at developing agri-tech should include the ability to work directly with farmers and producers – given they are the end user of the products and services.
- The feedback collected through this evaluation from businesses was that, whilst support for early-stage RD&I was highly important, it would have been useful to be accompanied by further support to help business commercialise/monetise those products. For small and micro businesses in particular, the difficulties in moving to a commercial product/service remain – the pathway was not always clear. In any future intervention it would be useful to have some focus on this next stage of business development. Without that support, the full extent of positive impact from the RD&I stage may be constrained.
- Despite the difficulties in building and establishing the Future Farm platform, it is now seen as a potentially highly significant asset with the overall agricultural research landscape. The early signs of interest from industry are encouraging. In addition, the early outcomes from some of the applied research taking place at the facility are already providing potentially fundamental insights, particularly on a 'whole farm system' basis. However, it is effectively a capital asset and will need continued revenue/research support to fully exploit this facility. For the wider South West agriculture sector it will be important that Duchy College and the wider research community are successful in leveraging further research funding (and potentially investment from private sources).

  In broad terms, this is a recommendation for the wider funding community e.g. UKRI, UK Government etc.

PROJECT: 2 Minute Farmer

IMPACT: Development and testing of 'tractor wheel of life' tool designed for farmers to assess how satisfied they are with different areas of farming life. This tool breaks down farming into 10 themes: Future, Production, Paperwork, Money, Environment, Lifestyle, Communication, Assets, Management, Skills. There is a '2 Minute' self-assessment for each topic to help farmers set goals and to help them open up conversations around important issues. It also includes a goal setting section and signposting information. There are paper and electronic versions of the tool. So far, it has been road-tested on several groups and received very positive feedback. The tool is available on the web. The project closure report states that farmers in Cornwall have already started making improvements to their farm business after using the tractor wheel of life, and that this is expected to have business benefits. A range of possible benefits are identified, but none is quantified.

LEGACY: Completion of the funded phase of the 2MF project will mean the 2MF website will need to be reduced to become low maintenance or terminated. This will result in aspects of the KnowledgeHub being discontinued with appropriate pages being absorbed into the Farming Health Hub website. The research outputs of the project have been summarised into research reports, adapted and distributed to each of the partner businesses. The Tractor Wheel of Life will remain available to the public. However, any businesses who wish to use and dissipate it will have to reference Duchy College and it will not be editable without prior permission. Ownership alongside permission to edit will be passed onto HH consultancy.

PROJECT: Anaerobic Digestion (AD)

IMPACT: A workshop was organised for AD practitioners from Cornwall and surroundings. The workshop was attended by representatives of 5 AD companies and covered microbiology of AD and its role within the circular economy framework. The results of experiments of this project were presented locally (meeting in Truro organised by the council), in UK (Biosolids conference, Manchester, Dec 2019) and internationally (Applied Microbiology conference in Leuven and an Ecology meeting in Tvarminne, Finland). The project closure report states that a slow turnover of sequencing data mean that the results of the experiments are still under development. Two publications are planned in the future: one on the impact of microbial community bioaugmentation on an industrial scale (with Fraddon Biogas) and one – a survey of antibiotic resistance genes prevalence in AD plants across SW (Fraddon Biogas, Langage AD, Ixora Energy and South West Water).

LEGACY: According to the project closure report, the big success of this project was the long-lasting relationships that were forged during the Agri-tech project. Collaborators have continued to provide biological material, expertise and feedback on the needs of AD industry. Further funding will be sought. The project built on existing research infrastructure and required no major capital investment. However, a 96-well spectrophotometer was purchased, and could be used in future experiments related to the study of AD microbial communities. In addition, a further £1mn research bid was secured based on this work supported through ACP.

PROJECT: Cell Grazing

IMPACT: An experimental and demonstration study was set up at Rothamsted Research North Wyke, where TechnoGrazing™ was compared against set-stocking as a control. There were three experimental plots per system (replicates) and separate groups of dairy x beef cattle used to graze each plot. Data was collected on animal condition, productivity and environmental impact. The project involved participation in numerous workshops and events, was reported in three press articles, gave five presentations and informed seven scientific papers. The project closure report argues that data collected and publications arising from the project will be highly valuable for informing policy and industry on the net environmental impact of contrasting grazing management methodologies.

LEGACY: The project closure report expressed a hope that the Cell Grazing project would be retained for the next grazing season (2021) as part of the institute strategic programme Soils 2 Nutrition (Biotechnology & Biological Sciences Research Council funded programme). The Cell Grazing project will provide data on the impacts of compaction from different grazing management practices, comparing set-stocking with the TechnoGrazingTM system. It was hoped that the Post-Doctoral Researcher would be retained across the 2021 grazing season within the programme. Ongoing collaboration was expected between Precision Grazing Ltd, Rothamsted Research and its networks, and between Philip Warren & Son Ltd and North Wyke Research Farm. It was hoped that the grazing management study would continue into the longer term to further strengthen the data and conclusions arising from the initial 3-year period, along with collaborations developed during the project.

PROJECT: Circular and Low Impact Processed Food (CLIP)

IMPACT: Working with two companies, Proper Cornish Ltd and Cornish Premier Pasties, University of Exeter developed a Cornish Pasty carbon impact assessment tool. One company expressed an interest in using the tool to assess alternative pasty recipes.

LEGACY: The two companies engaged expressed the view that the data collected could be useful in future, although COVID-19 delays precluded further application within the timescale of the project. Currently there are no specific plans to continue the relationship beyond the scope of the Agri-Tech Cornwall project. The project funded purchase of a Life Cycle Assessment (LCA) software licence and two food LCA Databases. These will remain at the University of Exeter. There are currently no IP restrictions or licencing in place.

PROJECT: Climate Hub

IMPACT: The Climatehub project developed, calibrated and applied state-of-the art farm- and field-scale climate and crop models to identify parts of Cornwall and the Isles of Scilly most suited to growing a range of novel crops under current and future climatic conditions. The maps are being used by project partner Farm Cornwall to deliver sound, practical and realistic advice to farmers and horticulturalists. The maps are embedded on an open source web platform. Working in partnership with Empowerment Innovation & Resource Ltd, the project designed and prototyped a new temperature sensor capable of accurately

measuring microclimatic conditions. The product underwent field testing in Cornwall and prototypes are being tested more widely across Europe. Avenues for bringing the product to market are being explored, but have been hampered by financial insolvency of the business partner. The project levered external investment and skills into the region. It was a significant catalyst for the securement of a Research Council-funded PhD on Novel crops in Cornwall (£145k) and external funding from Defra to apply the same farm and field-scale climate models to assess crop pest and disease risk (£350k). Alongside other work to understand climate impacts on wild species, outputs from climate models developed as part of Climatehub, are being used by Natural England and Defra to inform allocation of agri-environment funding under the Environmental Land Management scheme.

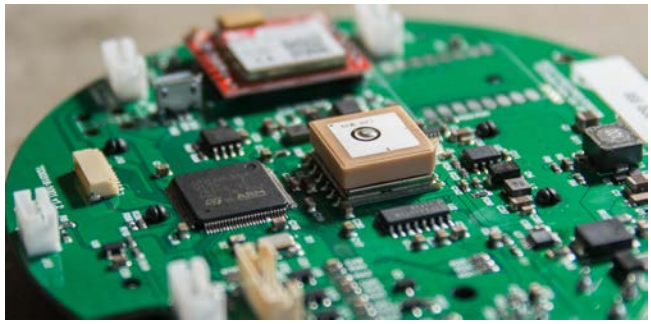
LEGACY: Planned follow on phases include: (1) the establishment of crop trials in places predicted to be climatically suitable, with discussions with Eden Project. (2) The application of high-resolution climate models to better assess crop pest and disease risk modelling with the ultimate intention of developing an online platform providing maps and forecasts of pest/disease risk. Funding has been secured for this. (2) Bringing the thermal sensor to market. Following the financial insolvency of the partner business, alternative routes to market are being explored. Work has begun to re-design and field test the devices, explore market opportunities and secure preliminary orders. The project was a significant catalyst in the establishment of a global network of microclimate-sensors, with the intention to facilitate research on climate risks and opportunities in the agri-sector worldwide. Thermal sensors have been deployed at 7369 locations worldwide.

PROJECT: Edible Insects/ Cornish Circular Economy

IMPACT: This multifaceted project made several key developments in the field of edible insect production. This included creating regional collaborative networks between insect producers, potential customers and businesses who would like to develop innovative and sustainable ways to recycle their organic by-products. An event raised the profile of insect farming within Cornwall, highlighting business opportunities and providing legal advice and networking opportunities to recent start-ups. A desk study and feed trial developed biologically informed circular economic models which highlight the potential of feeding brewery by-products to G.sigillatus and other commercially important insect species. This work revealed that brewery by-products represent a promising source dietary nutrition for edible insects and could bring wide-ranging benefits in terms of reducing insect feed costs and managing waste from industry. The project also developed novel artificial diets for G.sigillatus, and identified important caveats in the 'industry standard' nutritional geometry methodology which it hopes to share with the wider scientific community. Further Innovate UK funding was secured by the company associated with this project.

LEGACY: It is hoped that many of the relationships formed within the project will continue beyond the project end. For example, the Principal Investigators are currently developing an application for the ISCF transforming food production systems call in partnership Entec Nutrition, which now has a registered office in Cornwall, and is being helped to apply for small grants to support product and market testing. Other collaborations are being explored with St Ewe Eggs, FXPlus and Tira Ecological Solutions. Laboratory equipment, consumables and software purchased for the project will continue to be kept within the relevant laboratories and used in subsequent research.

PROJECT: Environmental Sensors



IMPACT: Working with two companies (Concept Shed Ltd, Falmouth and Torbett Design Ltd, Bristol), the project involved: scoping the potential to construct a range of low-cost devices for monitoring air (i) temperature and humidity (ii) soil moisture, (iii), soil pH, (iv) ambient sound, (v) solar illuminance (vi) wind speed and direction and (vii) air quality; building several prototype devices to measure (i) temperature and humidity (ii) soil moisture, (iii), solar illuminance and (vi) wind speed and direction; research investigating the size of the potential market for these devices domestically and internationally; working with two SMEs to bring-to-market one of the prototype sensors (a low-cost microclimate temperature sensor); testing of prototyped devices against research-grade instrumentation; initial production of 200 of the devices; securing provisional promise of purchase from international clients in Finland, Sweden, Belgium and Switzerland and UK. The project resulted in a new business assist (company now has enhanced capacity to develop environmental sensors and capability of building additional devices to order) and the bringing of a new product (temperature logger) to market.

LEGACY: An initial manufacture of 200 units of the temperature logger was anticipated by early July 2021 (after some delays related to COVID-19). Additional testing will be carried out in the period Aug-Nov 2021, mostly around the durability and ergonomics of the device as the testing of thermal performance is already complete. Prototypes will be sent to other researchers for testing and feedback on re: design / durability and to garner international interest. From Sep-Dec 2021, Concept Shed Ltd will build devices to order. This affords opportunity to discuss key considerations around untested elements of the design, specifically the durability of ultra-fine-wire thermocouples to winter weather conditions. The product will be commercially available from Jan 2022, with an official product launch at the international microclimate symposium in Antwerp in March 2022 (a product stand and presentation has been booked).

PROJECT: The Farm Crap App Pro

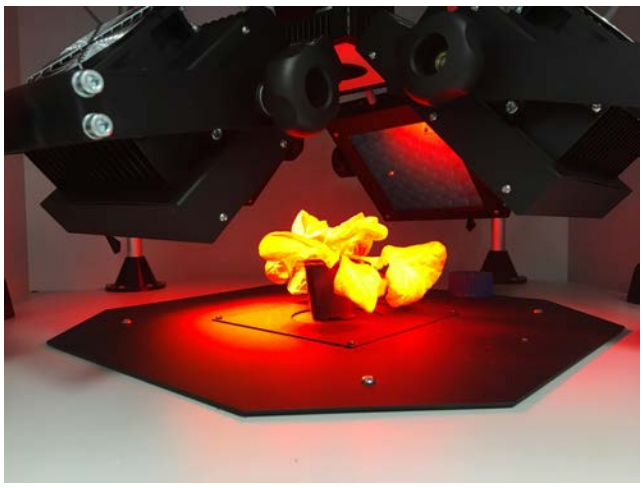
IMPACT: The project developed a fully integrated nutrient management planning mobile phone app as a further iteration of the previous Farm Crap App. The Farm Crap App Pro built on the existing collaborative relationship between Duchy College and Rothamsted Research that enabled the development of previous version of the Farm Crap App. The project has produced a mobile phone app that provides agricultural consultants and advisors with new commercial opportunities to advise farmers and landowners on a range of issues related to nutrient management and environmental planning. In addition, it has

provided an advanced product and new knowledge to enable businesses involved in resource waste management and utilisation (e.g. AD plants, green waste composting, and agricultural contracting) market agricultural opportunities. Making the app easy to use will help ensure seamless integration with farm records, enhanced monitoring and evaluation capability and greater opportunity for compliance with regulation. Two SMEs, Curtis Brothers Contracting and S. L. AgriConsultancy, identified the potential of the app to improve their offering to clients primarily through the addition of a data sharing function to allow multiple users to access the same data. The app is expected to deliver a range of business and environmental benefits (not quantified).

LEGACY: The app development is an iterative process and there are already plans for new versions incorporating feedback from engaged SMEs and end-users. Any new developments will be produced through the same partnership, but would require grant funding to proceed. The Farm Crap App Pro will continue to be free to download. The app will be adopted as a training tool within the new National Lottery-funded Net Farm Zero project and thereby contributing to the move toward a carbon neutral farming industry. Duchy College's Rural Business School will continue to provide on-line support of technical information pertaining to the app.

PROJECT: Fluorescence Imaging for Nutrition and Disease (FIND)

IMPACT: The project developed non-invasive image-based diagnostic tools to monitor plant health. It designed and built hardware and image processing tools to fit the imaging platform into lab growth cabinets and Plant Factory vertical farming systems. It worked with Cornish businesses to build, to a commercial standard, hardware to diagnose disease, remove diseased or unhealthy plants and apply fungicide or nutrients as appropriate. The second stage involved running workshops and working collaboratively with Cornish businesses to test commercial applications. Intensive support was provided to two companies working with macroalgae (Cornish Seaweed Bath Company; Seaseed Genetics), and discussions were held with three other businesses. Close links were formed with four other Agritech projects (Plant Factory, Speciality Crops, Fab Soil, University Sensor Group). The FIND research team presented and participated in workshops, scientific meetings and public engagement.



LEGACY: Major outputs which may lead to further collaboration with businesses are: 1. Demonstration that fluorescence imaging and LAMP can be used effectively to diagnose early symptoms of a range of plant diseases. Project partners were invited to participate in a workshop on early disease detection and have been approached by a company (outside Devon) who would like to explore common ground. 2. Demonstration that fluorescence imaging may be used to provide high throughput characterisation of seaweeds for commercial exploitation. Seaseed Genetics are actively pursuing funding with them to exploit the preliminary work done during this project. The FIND project has generated a lot of interest with research, environmental and commercial institutions around how this technology can be applied. Equipment purchased will remain with the research group at the University of Plymouth (Fluorocam, Lumiscope, Loop-mediated isothermal amplification (LAMP) equipment, Microbial growth incubators, 3D printer, Cooled Centrifuge). This equipment will support work on a newly funded INTERREG ReCon soil project and will be used to continue supporting the businesses worked with and research developed through Agritech. The partners are discussing further grant proposals where appropriate and it is anticipated that this equipment will be used for those studies.

PROJECT: Genetic Assignment Resources for Lobster Conservation and Fisheries Traceability

IMPACT: The project involved testing and developing genetic screening techniques for services that could be used to assign clawed lobsters to three levels (species, population, family) for purposes of aquaculture development, stock conservation and seafood traceability. It provided business support to the National Lobster Hatchery (60 hours support including construction of a refined broodstock tissue archive, engagement at meetings, compilation of progress reports and newsletter contributions, and presentations of progress, results and commercial implications); and Wing of St Mawes (12 hours support including meetings, progress reports, presentations). The project led to two scientific publications, two presentations and two articles.

LEGACY: Collaboration was planned to continue beyond the end of the project. As well as developing the genetic markers and related software/tools, the project has helped deliver commercial links and opportunities to the business partners, most notably for the NLH, Reefauna Ltd (a German company operating contracted restocking around the North Sea in mitigation for development of offshore wind) and Île de Ré Communauté de Communes (a French social enterprise managing stock enhancement of their local lobster fishery). The NLH has now also had a complete computerised record of their broodstock archive created, and backdated to include all females used since 2013. The tissues associated with this archive have been sorted, reorganised and transferred to the University of Exeter for storage (with NLH retaining access rights), freeing up space for them to continue to archive tissues of all hatchery broodstock used in the immediate future. The few purchases of hardware and laboratory equipment (i.e. a laptop for desk-based work, a set of pipettes for molecular work, etc) made on this project remain with the Molecular Ecology and Evolution Group, Exeter University. The project has helped to facilitate the award of funding from the European Maritime and Fisheries Fund (EMFF) for a 6-month post-doctoral research collaboration to deliver the same sort of technological advances for use in the conservation management and aquaculture development of the threatened and highly valuable European spiny lobster, Palinurus elephas, which will continue to engage this project's lead researcher at Exeter.

PROJECT: Passive Cooling

IMPACT: The project developed and tested the use of new technology to remove heat from cow sheds/barns. It worked with two business partners to build and test prototypes incorporating graphene materials/coatings, to alleviate heat stress and thermal management in the cow shed/barns. Outputs included presentations, publications, a workshop and outreach activities. The prototype testing is ongoing in laboratory and the project concluded some initial assessment of graphene coating as a heat absorber.

LEGACY: The project hopes to achieve the working prototype for cow barns and test it under different atmospheric conditions. Once the technical testing has been carried out, it will be taken to local cow barns for functional studies to test and the collation of get the relevant data sets which can be available to disseminate to stakeholders and industry market people. The identification of a collaborator to test and optimise the device locally was expected to take place in the next year. It is hoped this will open up economic opportunities in Cornwall and generate IP which could be licensed. The project is expected to reduce energy use in cow barns and create green jobs.

PROJECT: Phosfield

IMPACT: The project has produced a prototype in-field soil test kit for plant available P and soil specific fertiliser recommendations suitable for use by farmers, agricultural extension workers, agronomists and other land users. This will be of benefit to them by enabling more frequent sampling and measurement than the conventional three yearly testing period. This will enable changes in plant available P to be taken into

account. It will also allow more spatially detailed measurements both of which would enable precision fertiliser applications ensuring maximum crop yield whilst reducing environmental pollution of local rivers and waterbodies. After testing and feedback in Africa it is clear that farmers and agricultural extension workers see the need for soil testing, which is not available at present, and this would enhance yields by increasing appropriate fertiliser use. Working with a product design company has enhanced the prototype test kit making it more user friendly and nearer to market.

LEGACY: Unfortunately, as the CleanGrow sensor was not suitable for use with soil extracts, the Follow-on Funding application to trial the fertiliser recommendations using the developed test kit was not successful and alongside the restrictions due to the COVID pandemic, this left a gap between development of the prototype and introducing the kit to market. Therefore, the partners are seeking companies interested in developing this further and introducing it to market. The partners are being assisted in this by RRes Innovation and Commercialisation Office with a view to taking this forward through Phosfield Ltd.

PROJECT: Plant Factory, Cornwall

IMPACT: The project built a multi-tier hydroponic system with Controlled Growing Environment (CGE) conditions in which to test elements of the environment to optimise plant growth. An advanced plant factory system was built in collaboration with several Cornish based businesses (SolarGrow Ltd/Future-Farm Ltd and Ginium). This was fitted with two types of hydroponic systems and a customised LED controllable light system. The Plant Factory was used as a demonstration site for interested organisations and achieved national and international attention. The project undertook a high level of research focusing on increasing the understanding of the influence of optimised lighting spectra on crop yield and chemical quality of selected plant species. This moved the project into researching pharmaceutical and medicinal plant species under laboratory growth controlled conditions. The project resulted in the publication of several research papers. A number of students also undertook work experience in the PF with two starting their own company. The project team gave presentations at workshops, conferences and events and was featured in press and media. Seven businesses were assisted, and seven research collaborations developed. Several "affordable Plant Factory models" were built on site for Cornish based companies at different costing levels based on the experience and findings of the PF team.

LEGACY: 1. Helping to create a new to market/firm products & introducing a new agricultural technique to Cornwall - setting up plant factory system in a shipping container. This technology has been adapted by several commercial producers and companies in Cornwall including Cornish Essential Oil Ltd, Riviera Produce Ltd and Phtome/Trelonk. 2. Development of international projects in Plant Factory systems with Saudi Arabia and Egypt. 3. Development of the concept of "Agri-Pharmacy" - using pharmaceutical plant species grown in the plant factory system, an extremely interesting link was created to make use of the plants which have a consistent, high quality and desirable chemical profile for pharmaceutical applications. Various plant extracts have been tested on specific types of cancer cells and promising results were obtained. Further research/ testing is being undertaken at Derriford Research Facility for use as novel therapeutics for cancers and neurological diseases.

PROJECT: Soil Carbon Project

IMPACT: The project field-tested a series of proxy measures of soil carbon, including soil organic matter, and an inter-lab comparison. 85 commercial farms visited, soil samples were taken from 436 fields on one or more occasions. These provided core data, supplemented with information on type, use and management. The project engaged with SME partners, including the Farm Carbon Toolkit (FCT), whose engagement enabled them to enhance their understanding of soil carbon on whole farm carbon footprint. A significant output has been an improved understanding of soil sampling and analysis best practice, culminating in the creation of a Field and Lab Guide to disseminate the findings to farmers and advisors. The Guide will help a range of SMEs provide improved support to their clients and thus improve the sustainability of their businesses, and has the potential to inform policy relating to agricultural support payments for public goods

LEGACY: A prime legacy has been the formation of the Farm Net Zero project, a collaboration between Duchy College's Rural Business School, the Farm Carbon Toolkit, Westcountry Rivers Trust, Innovative Farmers and Innovation for Agriculture, funded by the National Lottery's Community Fund which will run from 2021 to 2025. Farm Net Zero is a £1.3m project born from the Soil Carbon Project and incorporating elements of Crap App Pro (in its knowledge transfer to farmers). It will involve key staff from the Soil Carbon project, while the technical lead will be Farm Carbon Toolkit, one of the primary SMEs participating in the Soil Carbon project.

Farm Net Zero will continue the research, soil sampling on 40 farms in East Cornwall and helping the Cornish agricultural community to understand the practices that influence soil carbon.

The project will support the development of the new ELMS, particularly with regard to developing means of measuring and assessing soil natural capital and building on evidence of soil quality as a public good and soil carbon as a potential tradable asset. The Soil Carbon project team has already supported an ELMS Test and Trials project led by AONB testing the potential value of soil scanning technology. The production of a Field and Laboratory Guide will enable industry-standard procedures to support grant and advisory schemes.

An oven purchased to dry soil bulk-density samples provides Duchy College with enhanced capacity to undertake in-house soil sampling and analysis thus providing both a teaching and research resource as well as building local capacity.

Engagement in the Soil Carbon project has provided significant benefit to The Farm Carbon Toolkit and Farm Carbon Consultancy in particular, demonstrable through their enhanced national profile, a rapid expansion of staff and the acquisition of numerous new business, research and development opportunities.

A strong working partnership between Duchy College, Rothamsted Research and Plymouth University will underpin new collaborations, and joint publications are planned. The unique and rich datasets consisting of over 9,000 records will help continue and inform new research. The reports, guides and academic journal publications will guide sampling of soil carbon on-farm and in future research.

PROJECT: Speciality Crops

IMPACT: The project aimed to assist Cornish businesses and growers to identify, research and evidence the added value of extracts of seaweeds and native plants for anti-aging and UVB protection properties to be used in topical skin-care treatments. It developed and applied a unique 'human skin equivalent platform', replicating skin to give continuous and real-time insights into tissue and cellular 'events', thus giving insights into the ageing process and allowing different materials' anti-wrinkling effectiveness to be tested. The project collaborated with Cornish SMEs to identify new plants with novel properties which could be integrated into existing product lines and worked with SMEs and growers to analyse the functional compositions of current products and propose new formulations of products and services. The team worked to validate the biological functions of plants and products of different Cornish SMEs, assisting them in providing scientific evidence for the benefits of their products using 3D printing, cell culture and molecular techniques.

LEGACY: The project could not find a relevant local company to develop the skin platform technologies with. Some companies were possibly expecting more hands on assistance. However, the development of the skin platform will revolutionise how chemical extracts from plants can be tested for a host of skin and wound related conditions including from ageing to cancers, burns etc. NASA have been in contact to research if this technology can be used to replace damaged skin in high risk environments and this conversation is ongoing. COVID has disrupted plans for further research, but this is expected to resume in future, with increased demand for new treatments and drugs. Two companies, Cornish Seaweed Company and Skincare, have been helped to assess and develop their products.

PROJECT: Reducing starling impacts in cattle housing

IMPACT: The project succeeded in trialling a new technology (Sonic Nets – a non-lethal acoustic deterrent) in a novel setting. The project collaborated with farmers, two pest control businesses, and a technology business. The greatest benefit of the project was a rigorous test of Sonic Net technology in a real-world scenario, with demonstrated benefits to farm businesses, and clear potential of economic opportunities for manufacturing and pest-deterrent SMEs in Cornwall.

LEGACY: Positive engagement with farmers has resulted in many of those involved being open to further collaboration with research relating to pest-deterrent technology. Many farmers have shown interest in the Sonic Net technology, and the transfer of knowledge has benefited farmers and researchers alike. Farmers were interested in hearing unbiased critical review of existing deterrent technology, with many of them aware that easily-available information usually came from marketing material. All non-consumables purchased for the project that may be re-usable have been stored at the University of Exeter (Cornwall campus). This includes speakers, amplifiers, and cabling used on Sonic Net trials. The total value of these assets when new was less than £1000 total. Future work on Sonic Net technology has the potential to benefit those partners and collaborators previously involved, but also has the potential to highlight further uses of the technology that could expand benefits across regions and sectors where pest problems are not currently mitigated sufficiently by existing technology. The coronavirus pandemic has perhaps increased the prevalence of the work within the project to assess the spread of anti-microbial resistance and the results of this work may prove to have global significance.

PROJECT: Toolbox of Multi-species swards (TOMS)

IMPACT: The greatest benefit achieved by the project has been the increase in knowledge around growing herbal leys in Cornish soils and climatic conditions and the fact that all the research needs of SME partners have been addressed. There is now a greater understanding of what establishes and thrives, which will help to ensure farmers sow what is likely to grow, making herbal leys more cost-effective, thus addressing one of the primary concerns highlighted in the perception survey. This has also provided South West Seeds with an evidence base for the recommendations, along with data around forage quality, which is frequently requested by their customers. Research has been undertaken on the micronutrient contribution of herbal leys, which could have a significant impact on animal health in future. A reduction in diffuse nitrates was seen from herbal leys, which will aid Cornwall Wildlife Trust's work on the Upstream Thinking project and the perception survey has highlighted where there are barriers to uptake which can be addressed in future. Outputs included a series of workshops and events, and 5 scientific papers have been published or are in progress. The development of the Multi-species Sward App has added considerably to the range of tools available to businesses concerned with the development of more diverse pastures. The app currently has 243 users in 12 different countries and has received national coverage via a feature in the Farmers Weekly. There is scope in the future to increase the range of parameters and input factors within the app, and thereby further increasing functionality. The project has resulted in a large body of relevant data and information on a range of issues related to the establishment, management and benefits of multi-species swards which address the gaps in knowledge apparent at the start of the project and leave a lasting legacy in terms of forage-based research in the south west of England and nationally. All of the outputs of the project have been compiled and are presented in a website toolbox, due for launch in autumn 2021 at www.multispeciessward.co.uk.

LEGACY: The trial plots established on farms throughout Cornwall, as well as the replicated plots at Duchy College Home Farm and Rothamsted Research North Wyke will exist beyond the end of the project (a typical multi-species sward ley would be in for around 5 years), so the potential benefits of those swards, including increased organic matter, carbon sequestration and pollinator resources amongst others, will likely continue for at least another 2 years. The plots sown at Duchy College Home Farm, as well as the split field

trial sown, will continue to be used for research work over the course of their lifetime. The plots are already being utilised by researchers from the Cornwall College Newquay campus and are likely to be used for student projects in the future. It is also hoped that many of the lessons learnt during the course of the project can be integrated into the curriculum provision. The TOMS project has helped to establish Cornwall as a leading area for research into multi-species swards and has enhanced the forage research capacity of the region for many years to come. The project has also encouraged a number of SMEs to engage with R&D and to see the value of such activity for their businesses. In addition it is hoped that the experience of growing multi-species swards as part of the TOMS project will encourage those participating farmers to grow more diverse forages in future, with the added impact of peer-to-peer knowledge exchange and recommendation potentially increasing the overall number of multi-species swards sown. The relationships built up with the collaborating business partners and trial farmers will continue and further research partnerships could develop depending on funding. The wider network of contacts built up with national bodies has helped to bolster the reputation of Duchy College as a research institution and future collaborations would be welcomed. The website and app will remain available to the public after the end of the project, indeed should further funding sources be identified, there is scope to develop the app further. Equipment purchased has included soil augers, a vacuum pump, lysimeters, glass collection bottles, various field equipment and a freezer. These resources will remain at Duchy College and will be available for future research work, including trials at Future Farm and can potentially also be used by students.

PROJECT: Viticulture

IMPACT: The project investigated developing a 'cloche' system for vineyards that can help off-set adverse microclimatic conditions that negatively impact grape production. The project was in collaboration with SmartVit, a viticulture consulting business based in Truro, Cornwall. Working with several Cornish vineyards with differing micro-climates, the cloche system was tested and compared to open vines, measuring both their effectiveness in promoting fruit-set and reducing fungal infection by Botrytis. Investigations to explore the relationships between optimal growing conditions, biocontrol agents and pathogens assessed effectiveness of these interventions in vine management. Two scientific papers have been submitted.

LEGACY: The project developed strong ties with Cornish growers and made agri-tech industry contacts. Spare cloche, installation tools, field equipment including backpack sprayers and PPE are stored in UoE field site's compound, where three rows of 50m trellis supporting approximately 200 Seyval Blanc vines are planted. Temperature and relative humidity data loggers, and a paddle blender with sterile bags remain in BR's laboratory (SERSF). The project manager continues to engage with the viticulture sector across Cornwall to develop management practices for vine care. Although the bulk of this work has focussed on IPM strategies against Botrytis cinerea and pests (snails, slugs etc), he plans to pursue ideas centred on canopy and preventative disease management particularly against general trunk disease (GTD) which presents both an existing problem in most Cornish vineyards but also a long-term threat to the future of viticulture globally. Cornish viticulture presents a good testing ground for hypothesis about the ecology of GTD in cooler climate vineyards. Practically, for growers, early identification of GTD infected vines is central to effective management. Several MSc projects have been co-developed with the intention of validating putative GTD biomarkers.

PROJECT: Viz Ag

IMPACT: Project highlights were the completion of the "light-weight" SPACSYS model (agricultural decision support model designed to enhance efficiency and sustainability) albeit in a prototype web-based form. This output involved considerable technical expertise and provides a valuable first-stage platform from which future developments and iterations can stem. Although project goals were not fully realised, RRes and Glas Data working relationship was very good throughout with further collaborations expected. A SPACSYS-based decision support tool for on-farm monitoring is still a relevant prospect and has been well received at workshops and events. This is especially so, given SPACSYS' long history of development (20+ years), where only a subset of its full capability was ear-marked for this project. The key lesson learned firmly centres on constraints placed on how to use the funds for the technical expertise required to deliver this project. Outputs included numerous workshops and events, a case study and a scientific paper.

LEGACY: The SPACSYS model will be retained as part of the RRes institute strategic programme Soils 2 Nutrition (Biotechnology & Biological Sciences Research Council funded programme) and other funded projects where the SPACSYS model is both used and developed. It has been agreed that a SPACSYS-based tool will continue to be developed within RRes and where RRES see opportunities for collaboration in the future, when Covid and the financial difficulties it is presenting have passed, they will seek to reinvigorate the collaboration with Glas Data. The project purchased I.T Equipment in the form of a Dell Precision 3630 Tower which will be maintained and retained at Rothamsted Research North Wyke. It will be used for the continuation of the SPACYS modelling work.

These project descriptions do not include Fabricated Soil (FABsoil) and Autonomous Brassica Harvesting in Cornwall (University of Plymouth led), Dairy Cow Welfare and Future Farm (Duchy College led - although see Annex 2 below).

Based at Duchy College, Future Farm will drive progress in efficiency and technology, animal health and welfare, as well as finding ways to improve the dairy sector's environmental credentials. The £3m investment will bring together a host of partners, with work centring around the College's herd of 200 Holstein Friesians.

The new research platform will include a host of features, including an ability to split livestock into three distinct 'mini' herds, allowing measuring and comparison of different management techniques. A computerised, precision-control feeding system and an ability to separate slurry and manure from the different groups of animals makes the facility unique, allowing multiple research projects to be run simultaneously, with inputs, output and milk production monitored through a "whole system" approach.

Future Farm will be different to some of the straight research organisations as it work with a commercially viable dairy herd.

"What we'll be doing will be extremely applied, rather than too blue-sky. The dairy sector is going through a tough time, with extremely challenged margins, so farmers need solutions that make a difference tomorrow, not in 10 years' time. Dairy is the main economic driver in the South West with 40% of the national production based in the region. We're trying to throw light on some of the opportunities." *(Paul Ward - Research Manager at Duchy College's Rural Business School)*

Researchers will collaborate with scientists and academics at other centres. It will also act as a learning platform for learners, giving Duchy students access to state-of-the-art resources and practical experience-building opportunities.

With so much more monitoring and measuring now happening in agriculture, part of the role of Future Farm will be to draw this together and work out which bits are most useful to farmers and how they can use it most effectively. The knowledge and insight the new facility provides will help shape the dairy sector as it works towards the NFU's target of net zero greenhouse gas emissions by 2040 – a target which the NFU says can be achieved through improvements in productivity, carbon capture and renewable energy production.

The table below shows those SMEs that have worked as collaborative partners within the research projects. It specifically shows those businesses that have developed either a new-to-market or new-to-firm product and/or service as a result of their involvement in this collaborative research activity. These have been captured and reflected in the ERDF outputs reported to date.

Research Project	Partner	SME	New Product	New to Market	New to Firm
Autonomous Brassica harvesting in Cornwall (ABC)	UoP	Access Robotics			
		Fieldwork Robotics			
		Kernow Robotics	Next Generation Farm Technology	✓	✓
		Mainland Marketing			
		Robotriks	RTU (Robotriks Traction Unit)	✓	✓
FABSOIL (Fabricated Soil)	UoP	BioChar Project Services	Biochar System Controls	✓	✓
		Green Waste Company			
Plant Factory	UoP	AntiBio UK			
		Cornish Essential Oils	Indoor Grow Unit	✓	✓
		Ginium	Vertical Farm Lighting Controls		✓
		Groktor			
		Hemp Club			
		Phytome Life Sciences			
		SolaGrow			
		Spanview UK			
		Uber Crop			
Speciality Crops	UoP	B Skincare			
		Cornish Seaweed Company			
PhosField	RR	CleanGrow UK			
		Grassland Resources and Improvement			
		Phosfield	Phosfield Rapid Test Kit	✓	✓
		Vital Spark Creative			
BioDigest	UoE	Cornwall Composting CIC			
		Fraddon Biogas Ltd			

ClimateHub	UoE	Climate Change Risk Management (CCRM)			
		EmPOWERment Innovation & Resourcing			
		Farm Cornwall	Climate Hub Interactive Maps		✓
		Parnall Group			
Starling Mitigation	UoE	Apt-GB			
		Terminate Pest Control			
Precision Grazing	RR	KiwiTech UK			
		Philip Warren & Son			
		Precision Grazing	Farm Action Groups		✓
		Ver Facil			
Farm Crap App Pro	DC & RR	Curtis Brothers Contracting			
		FoAM Kernow	Farm Crap App Pro		✓
		S.L AgriConsultancy			
		Potentially more to add by December 2021			
The Soil Carbon Project	DC, RR & UoP	Cornish Camels			
		Farm Carbon Consultancy	New Carbon Calculator App		✓
		Farm Carbon-Cutting Toolkit	New Carbon Calculator App		✓
		Kernow Agronomy			
		M A Grigg			
		Regenerative Food and Farming CIC			
		Rocket Gardens			
		South West Farm Consultants	Soil Scanning for Soil Health		✓
		The Lost Gardens of Heligan			
		The Old Mill			
		Tresco Estate			
		Westcountry Rivers Trust			
		Potentially more to add by December 2021			
SmartVit	UoE	Smart Viticulture			
		Animal Vet Services			
		Cornwall Wildlife Trust	Sward App		✓
		SC Nutrition Ltd	Silage Additive Advice		✓

Toolbox of Multi-Species Swards (TOMS)	DC & RR	South West Seeds	Sward App		✓
		Trifolium Services			
		Potentially more to add by December 2021			
Two Minute Farmer	DC	Edward Buckland			
		Farming Health Hub	2 Minute Farmer Tools		✓
		Healthwatch Cornwall CIC			
		Land to Sea CBT			
		Patientcards			
		SimSage (UK)	AgriTech Infosearch Enablement (Phase 1)	✓	✓
		Stephens Scown LLP			
		The CHAOS Group			
Dairy Cow Welfare and Management	DC	AntiBio UK	Ultrasonic Farm Water Cleaning	✓	✓
		Castle Veterinary Group			
		Glas Data	Online Dashboard User Interface	✓	✓
		SC Nutrition			✓
		South East Cornwall Grassland Society			
		Tricho Tech			
		Ver Facil	Low Power Long Range Sensor Agri-Tech	✓	✓
		Potentially more to add by December 2021			
Dairy Passive Cooling	UoE	4C Architecture			
		MDelta			
Farm Visualisation (VizAg)	RR	Glas Data Ltd			
Cornish Circular Economies (Insects)	UoE	Entec Nutrition			
		Granite Rock Brewery			
		Tira Ecological Solutions			

FIND (Fluorescent Imaging for Nutrients and Early Diseases Detection in Cornish Crops)	UoP	Cornish Seaweed Bath Company	Seaweed Extraction Improvement Process		✓
		Seaseed (Spirograph Sciences)			
		The Lost Gardens of Heligan			
		Phytome Life Sciences			
Innovation in bTB Prevention and Control	DC	Castle Veterinary Group			
Lobster Traceability	UoE	National Lobster Hatchery			
		Wing of St Mawes			
Natural Capital	DC	Kieboom Environmental Consulting			
		Lanhydrock Estate Company			
		Potentially more to add by December 2021			
CLIP (Circular and Low Impact Processed Food)	UoE	Cornish Premier Pasties			
		Proper Cornish			
Environmental Sensors	UoE	Concept Shed	Environmental Sensor	✓	✓
SCENT (Sensors Centre ofExcellence and Nano Technology) Project	UoP				
COVID-19 Food Supply Chain Project	UoE	Cornwall & Isles of Scilly LEP Cornwall Council			