# Overview of Underpinning National Capacity 2022-2027

## SAB review 8th November 2024

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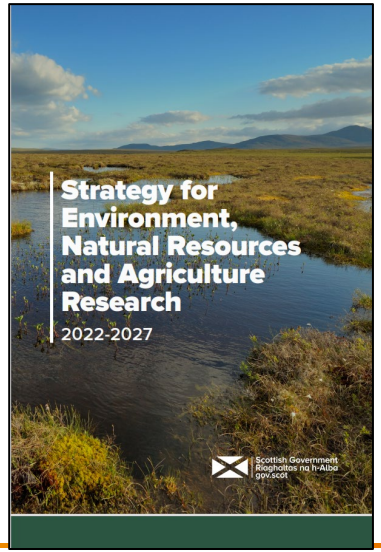
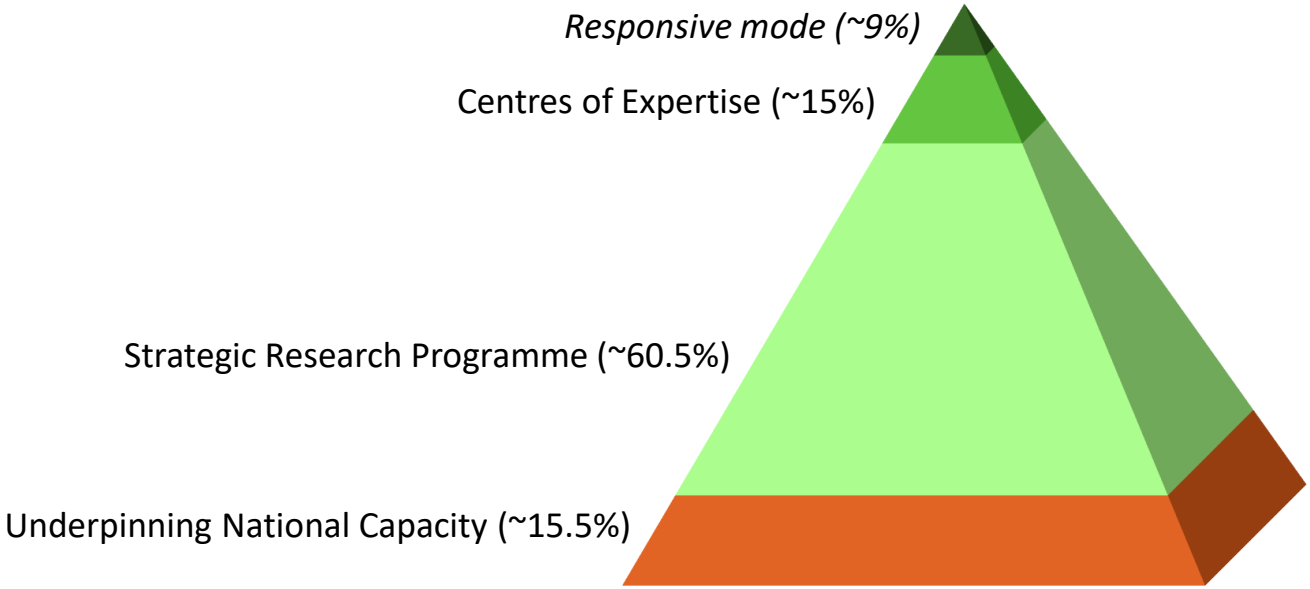
# Scottish Government Strategic Research Programme

**“To support research that is relevant, respected and responsive to Scotland’s environment, communities, its people and to the rural economy”**

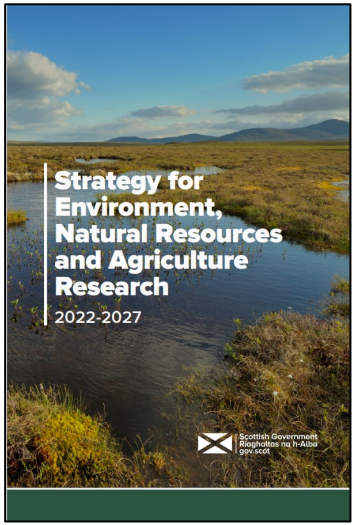



- Large scale, multidisciplinary programme with a budget of around £48 million a year
- Primary purpose of providing science and evidence to support policymakers within Scottish Government and its delivery partners
- Maintain long-term research programmes and science facilities which directly support Scotland’s academic research base, and allows research institutes to leverage in additional funding from other UK and international funders

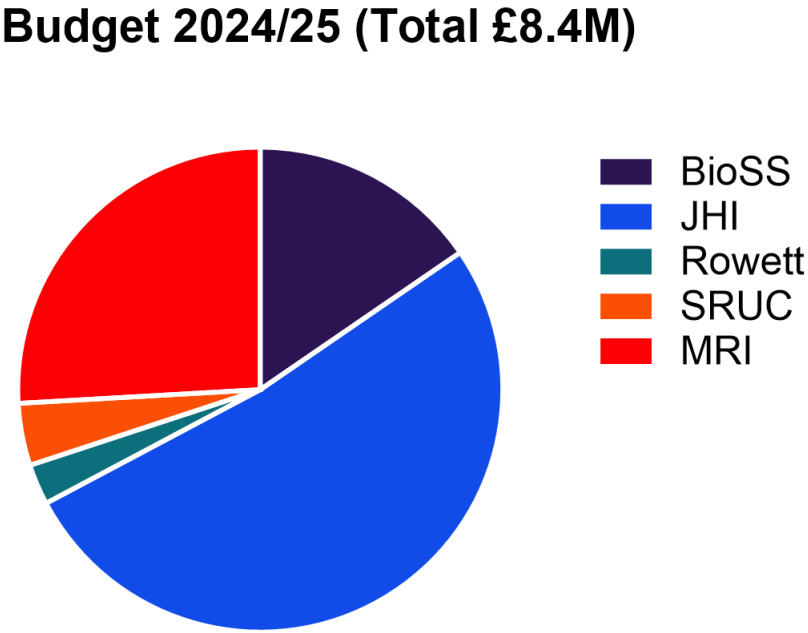
# Portfolio structure



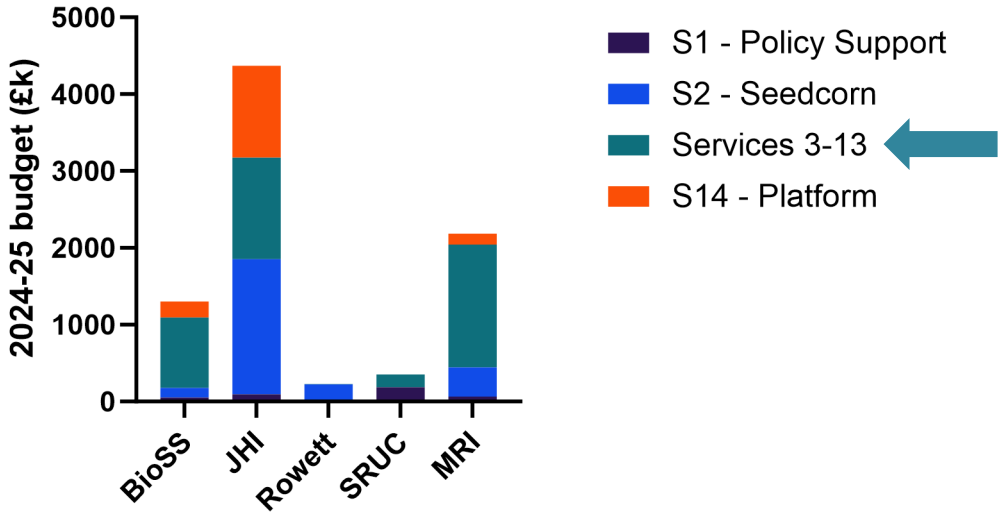

Long term funding at base short term funding at top



# UNC funding breakdown by MRP



# UNC funding breakdown by service



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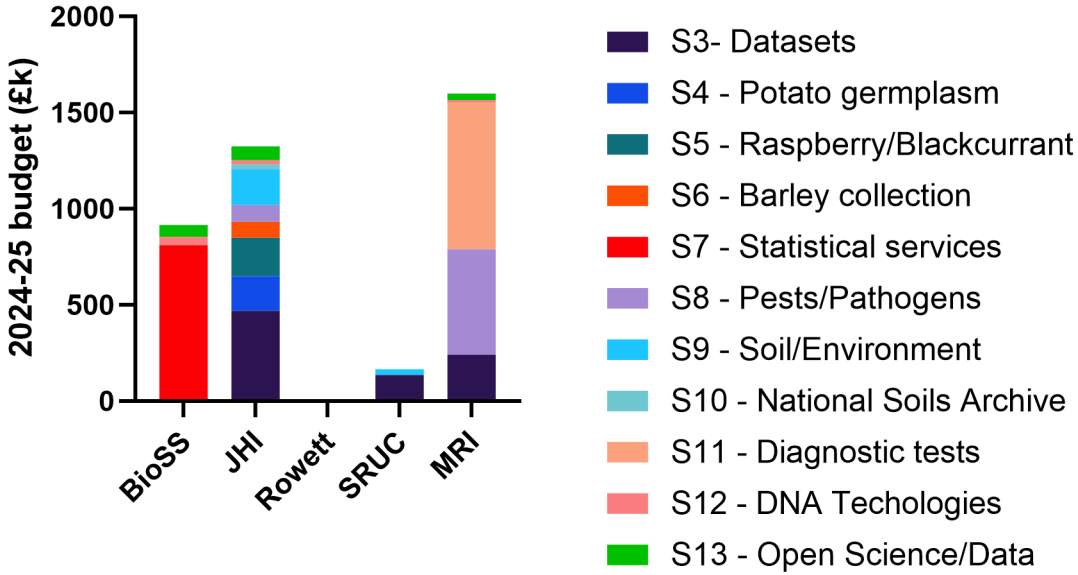
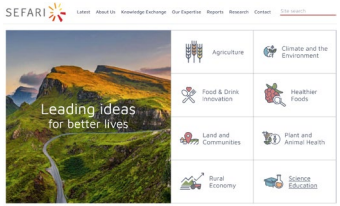
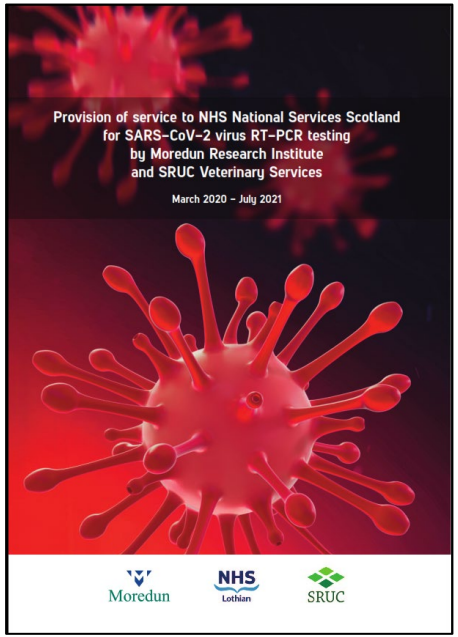


# UNC – DEC Measurement of impact and success

- Report to Scottish Government through annual MRP reports and researchfish by interfolio
- Impact framework coordinated through **SEFARI Gateway**
- Impact assessment generally **bilateral** between MRP and Scottish Government as significant differences in UNC support between the MRPs
- DEC ensures complementarity and no duplication of effort
- Coordinated approach to Seedcorn-funded PhD students through **Annual SEFARI PhD showcase** event
- DEC coordination of efforts for **emerging** major events

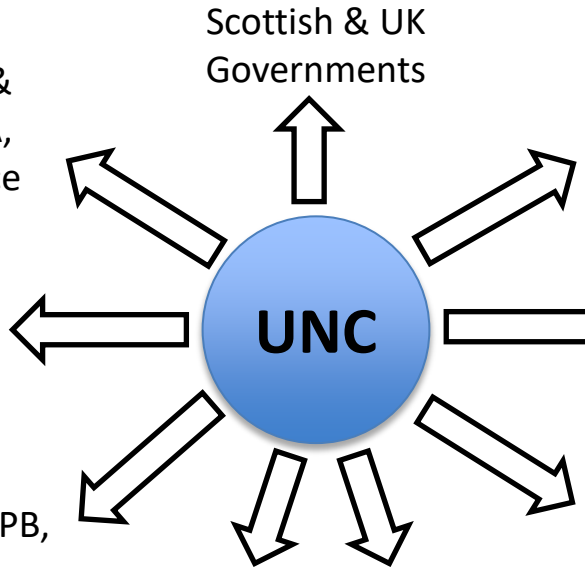


# Use of UNC during COVID-19 pandemic

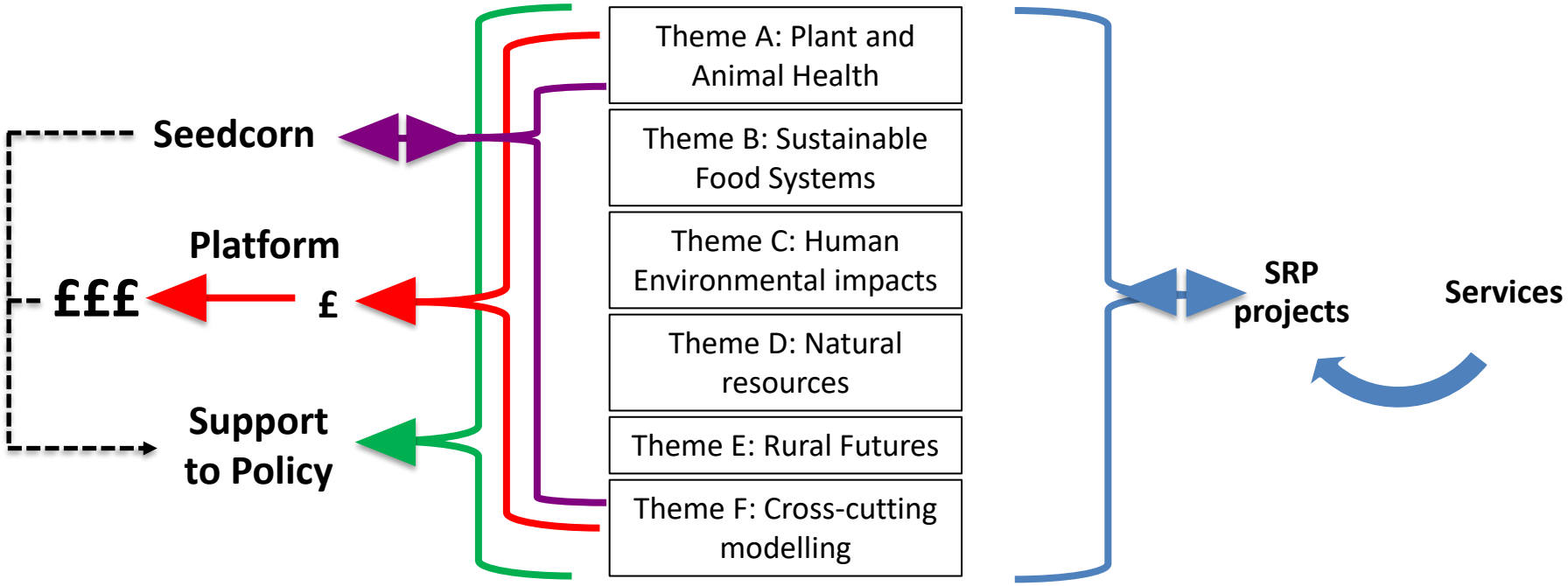




- Infrastructure
- Knowledge & Expertise
- Resource
- MRP Collaboration

# UNC main users



# UNC connections with SRP



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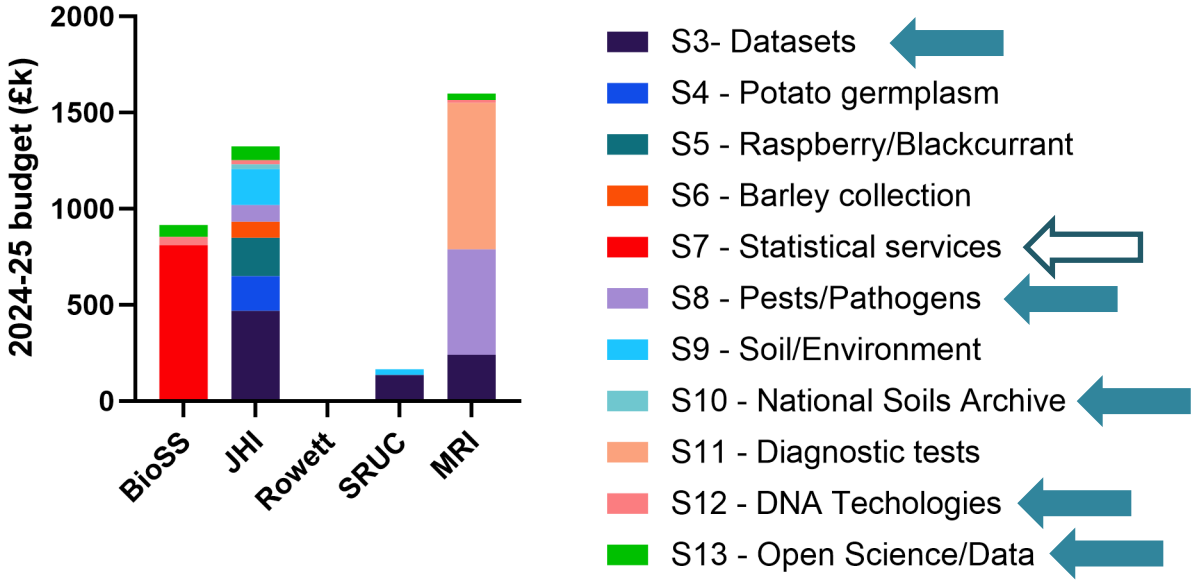
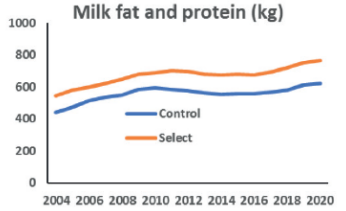
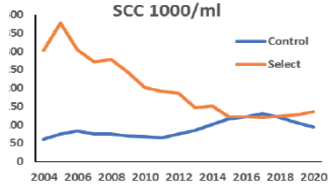


# Maintenance of long-term datasets – The Langhill dairy herd

- World's longest running livestock breeding study – established in Edinburgh in 1970s; based in Dumfries since 2002; moving to Barony
- Pedigree Holsteins selected for maximum milk solids production – Control and Select lines with comprehensive recording and sampling
- Extensive SQL database and sample archive has supported high value advances in many areas, both anticipated and unexpected:
  - Development of national multi-trait selection indices
  - Implementation of genomic selection, incorporating hard-to-measure traits such as immune-associated traits, fertility and feed efficiency
  - Development of novel biomarkers, particularly based on milk infra-red analysis
  - Housing and welfare standards
  - Carbon footprint, GHG mitigation and resilience to climate change

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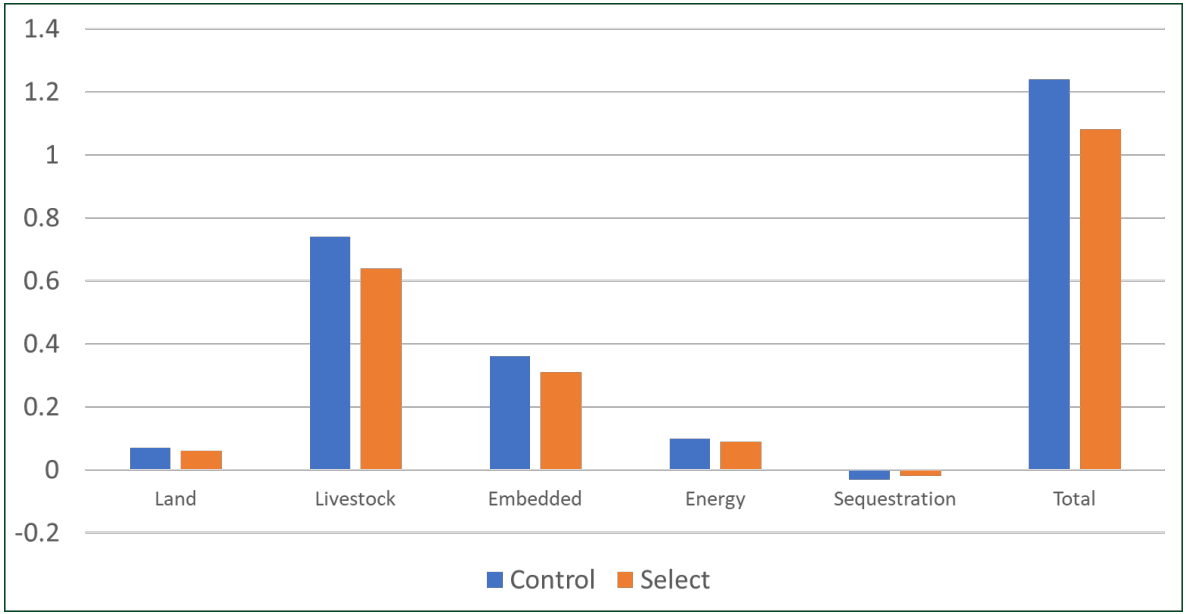
# Maintenance of long-term datasets – The Langhill dairy herd

SRUC

## Carbon footprints (kgCO2e/kg FPCM) 2006-2015

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# Maintenance of long-term datasets – The Langhill dairy herd

## EnviroCow index (range -3 to +3)

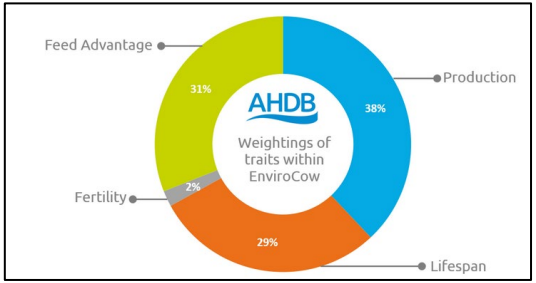
- Feed efficiency index that is central to the current breeding effort to reduce greenhouse gas emissions
- Based on long running records of feed intake and milk production

- **Control = -0.15**

(close to national ave.)

- **Select = +1.94**

(2 s.d. above national average)




# National Soils Archive (NSA) of Scotland

**NSA:**

- Approximately 60,000 samples catalogued
- 1934 – present
- Data held within National Soil Database of Scotland


**Recent Additions (<5yrs):**

- Auchencruive (x2 sites) – Long Term Sewage Sludge Trials samples (1838)
- Craibstone – Long Term pH Plots samples (184)
- Equine Biobank soil samples in association with MRI (114)

**Approved Withdrawals to Support Research (2023-24):**

- Scottish polyfluoroalkyl substances (PFAS) – mapping within Scottish soils (109)
- Scottish Sr isoscape (500)
- DNA extracts from NSIS sites

- Pending University of Durham – Query pre1950s soil samples for paleoenvironmental reconstruction
- Pending removal of samples to test new analytical procedures (under discussion)

The James Hutton Institute

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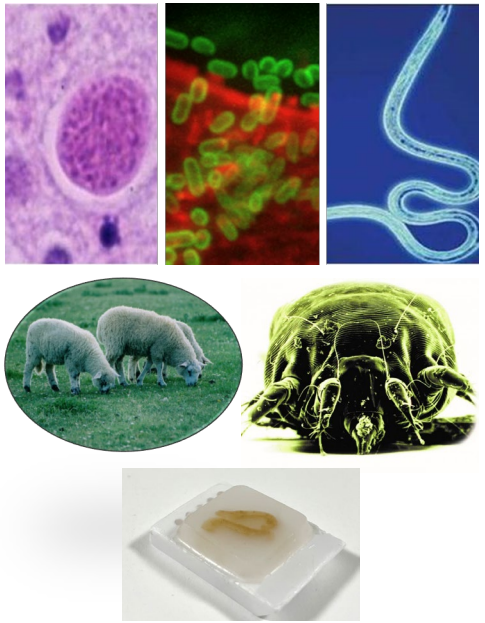
# Maintenance of pest, pathogen and tissue collections - MRI

Moredun Research Institute

- **Objectives**
  - **Build and maintain** living cultures & biobank of animal pathogens (viruses, bacteria, ecto- and endo-parasites including **Hazard Group 3 pathogens**)
  - **Build and maintain** biobank of animal tissues of known disease status from experimental and natural challenge studies
  - **Provide pathogens/tissues** on request (commercial & academic)
  - **Raise awareness & improve access** to catalogues, databases & collections
- **Successes and Impact (2022-2024)**
  - Supply of pathogens/tissue samples under MTA to **11 countries** around the world
  - **16 SRP projects** supported
  - **>50 external projects relying** on collections generating >**£26m MRI income** (EU/UKRI/Other)
- **Challenges**
  - Managing service expansion with rising costs vs. level funding



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# Maintenance of pest & pathogen collections - JHI

The James Hutton Institute

- **Objectives**
  - **Build and maintain** living cultures & biobank of plant pathogens and pests (Oomycetes, viruses, bacteria, nematodes, fungi, aphids, flies, weevils)
  - **Provide cultures** on request (commercial & academic)
  - **Host a suction trap** and collect samples for SASA's aphid bulletins
  - **Raise awareness & improve access** to catalogues, databases & collections
  - Adding an **evolutionary perspective** to research
- **Successes and Impact (2022-2024)**
  - **167 accessions** supplied to **24 service users** in **7 countries** around the world
  - **11 SRP projects** supported
  - **>12 external projects relying** on collections generating >**£2m Hutton income**
  - **>£100K income generated** from spin-out services (genotyping collections)
- **Challenges**
  - Managing service expansion with rising costs vs level funding


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# Provision of biomathematical & statistical services

BioSS

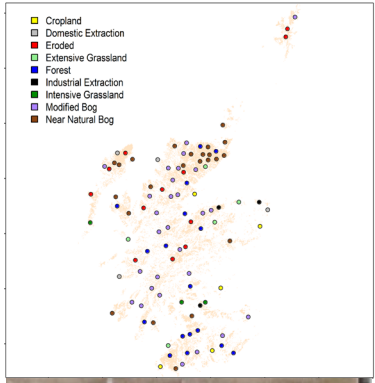
**Funds consultancy and training in statistics, mathematical modelling, statistical genetics and bioinformatics to support the SRP through:**

- Designing studies and experiments
- Supporting use of quantitative methodologies (at various levels of sophistication) via advice, training and coaching
- Contributing high level analyses
- Supporting better interpretation and description of analytical results
- Developing bespoke methods to meet specific SRP needs
- Contributing elements of *Translational Research*

# Provision of biomathematical & statistical services

## Delivery and recent innovations

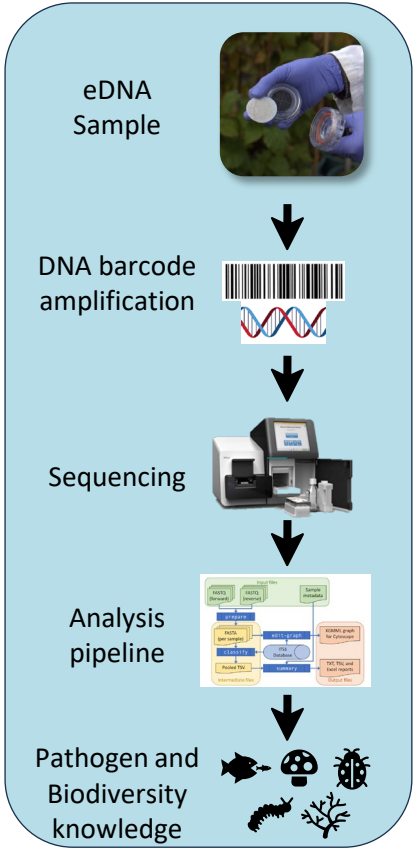
- A large pool of highly qualified, skilled and experienced statisticians, bioinformaticians and mathematical modellers
- Staff only partially UNC funded: all actively engage in methodological or application-driven research (RESAS and/or UKRI funded projects) and other consultancy projects (many funders)
- Aim to provide scientifically excellent inputs, **driven by the needs of SRP projects**
- Since 2022, more emphasis on **proactive engagement and innovation** & **large-scale modelling** e.g.
  - Designing sampling scheme for peatland monitoring network
  - Modelling of cattle trading network and associated Johne's disease spread




# DNA technologies, skills and infrastructure

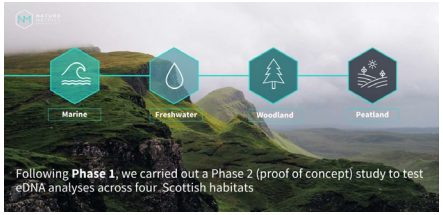
## *Capacity building to progress DNA technologies from research to operational use*

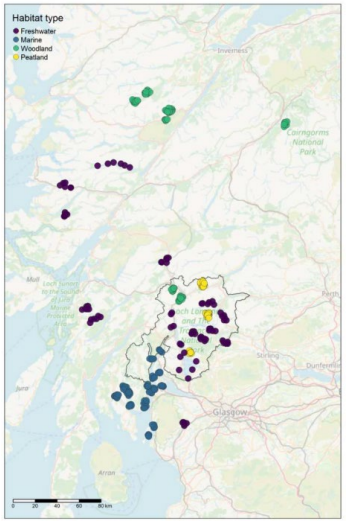
- Development of **methods and technologies** focused on environmental and pathogen DNA monitoring:
  - Survey sampling design
  - Sample stabilization and processing methodologies
  - Sequencing technologies –Metagenomics, RT-PCR array, PCR metabarcoding, Long-read Nanopore,
  - Standardised bioinformatics pipelines and reproducibility assessment
- **Application of technologies** e.g.,
  - AMR and zoonotic pathogen monitoring using DNA from soils, faeces, water, ticks using nanopore sequencing & PCR
  - Greylag goose population diversity assessment and zoonotic pathogen detection using goose faecal DNA
  - Fungi diversity in Cairngorms
  - POC metagenomic sequencing across four Scottish Habitats for microbes, vertebrates & invertebrates
- Engagement with **Scottish DNA Hub** to ensure coordination across Scotland – POC study to test eDNA analysis across four Scottish Habitats



# DNA technologies, skills and infrastructure

- **Successes and impacts**
  - Workshops on study design & analysis pipelines, Nanopore sequencing
  - Promoted DNA technology skills via blogs & presentations
  - Connected key MRP staff & other related groups (MRI, JHI, BioSS, RBGE, Scottish DNA Hub, Scottish Freshwater Group, Marine Science Scotland)
  - Connected stakeholders (e.g. NatureScot, SEPA, RZSS, National Parks, NMS, SASA, FLS, SWT, HES) with providers (e.g. MRI, BioSS, RBGE, JHI, UHI)



# Open science and open data

- Creation of MRP-level **Open Science Champions**
- Creation of Institute **Open Science policies** incorporating **FAIR** (**F**indable, **A**ccessible, **I**nteroperable, **R**eusable) principles
- **Training** in Open Science and Open data
- Creation and use of data repositories – Institute **GitHub/GitLab** repositories, **Research Scotland Repository** (MRI, BioSS, JHI), Aberdeen University Research Archive (**AURA**)
- Investment in data management infrastructure e.g., OMERO (Open Microscopy Environment) Imaging repository and HPC hardware
- Deposition of datasets in publicly accessible repositories subject to IPR issues
- Horizon Scanning exercise on impact of AI (BioSS)
- Production of ENRA Guidance Document on Open Science (BioSS)

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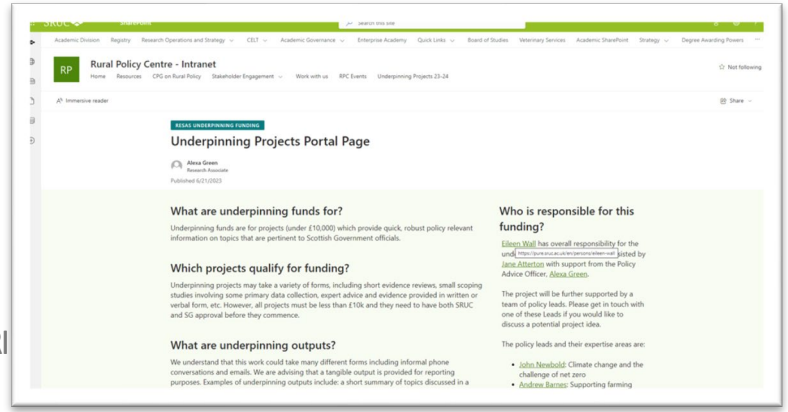
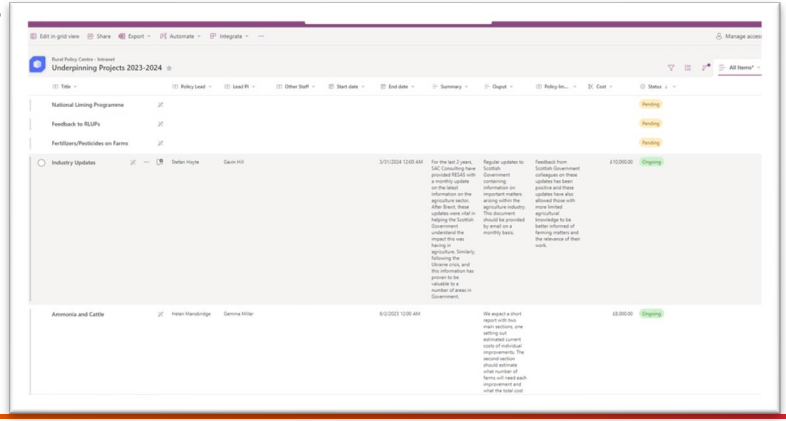
# Underpinning Policy Support

- **Objective: SRUC provides direct support to RESAS and Scottish Government policy teams through strategic policy assistance.**
- **Flexible and real time response**
- **Knowledge Support Hub:** Facilitates efficient information flow between SEFARI Institutes and policy makers.
- **Flexible Support System:** Adapts to deliver tailored projects and policy insights.
- **Impact:**
- Supports SG's strategic initiatives like climate action, agricultural reform, and community welfare.
- Ensures timely, evidence-based responses and analysis for policy needs.

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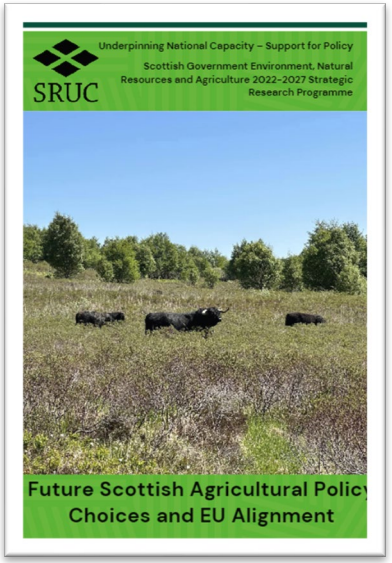
# Analysis of alignment between Scottish agriculture policy and CAP

- **The Scottish Government aims to align its future agricultural policy with the EU Common Agricultural Policy as part of its commitment to maintaining compatibility with EU standards and ensuring minimal disruption if Scotland re-joins the EU. This alignment helps ensure continuity and eases future transitions.**
- **Challenge: Understanding how current or proposed Scottish policies align or diverge from the CAP and identifying areas requiring adaptation.**
- Conducted detailed comparative analyses of Scotland's agricultural policies against the new EU CAP framework.
- Provided actionable recommendations for policy amendments to meet alignment goals.
- Produced a formal written report for the Scottish Government and facilitated discussions to guide policy refinements.

**Benefit and Impact**

- Informed decision-making within the Scottish Government's Agriculture Reform Programme.
- Provided a basis for aligning Scotland's policies with EU standards, strengthening the framework for re-entry to the EU if desired.

The findings helped policymakers understand necessary steps for aligning with EU CAP provisions, ensuring strategic foresight in policy development.



# Inclusive approach to prevent and control highly contagious sheep scab parasites

- **Sheep scab is a highly contagious disease, causing annual losses of £200M to sheep industry. Treatment options involve plunge dips and injectables and resistance to the treatments is spreading. Accurate diagnosis is crucial to ensure the correct treatment is given and to help prevent spread of the disease.**

## Flexible response

- Moredun has developed a new blood test that can provide early diagnosis of the disease before clinical signs appear.
- This diagnostic test has enabled new policy actions to be developed by Scottish Government to help control sheep scab.
- Moredun has been working with Scottish Government and other key industry groups through the Scottish Sheep Scab Industry Working Group to provide specific advice on how the new test may be best deployed to form the basis of local and regional sheep scab prevention and control schemes.


## Impact

- A very successful strategy has been established on the islands of Lewis and Harris involving an inclusive approach engaging with over 400 crofters and working with industry and government colleagues to develop an effective coordinated testing and dipping campaign involving over 30 000 sheep to help control sheep scab on the islands. The crofters can really see the benefits of this strategy in terms of the reduction in a significant livestock disease and the additional benefits of gaining advice on best practice disease control going forward. The highly contagious nature of this disease required everyone working together effectively to tackle it successfully.

Images: Scottish Government

# Missing Data in the Annual Scottish Agricultural Census

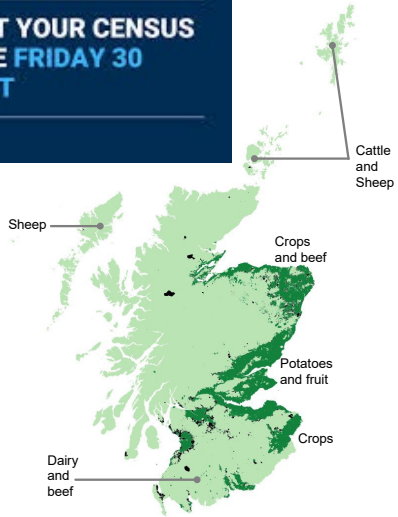
**The annual Agricultural Census is an important output produced by the Agricultural Statistics Unit (ASU) of the Scottish Government, valuable to Government in supporting policy, to researchers as a scientific resource, and to anyone interested in trends in Scottish agricultural production. Government statisticians asked for support to identify and implement better methods to deal with missing items in data collected.**


## Flexible response (over multiple Support to Policy projects)

- BioSS reviewed an ASU internal report, outlining possible methodological approaches. This required input from staff with specific experience of kriging, multiple imputation and survey design.
- Multiple imputation was identified as the preferred way forward, with BioSS then developing R code to implement this approach, providing ASU with a choice of methods. The code was evaluated, paying attention to the number of imputations required, how to deal with zero-inflation, and computational requirements.
- An R package was made available to ASU via a Git repo.
- BioSS supported ASU programmers in integrating this codebase into their workflow, and ASU statisticians in using it.
- We have recently proposed a follow up project to containerise the code, 'future-proofing' use of these R resources.

## Impact

- This work has supported production of official Agricultural Census statistics from October 2023 onwards.

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# Rapid Evidence Review of the Implications of Not Controlling Bracken with Asulam in Scotland


Photo: Robin Pakeman

## Issue

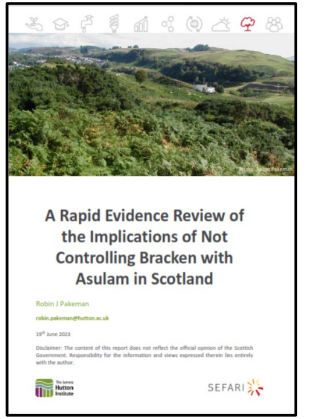
- Bracken is a, sometimes, aggressive species that can negatively affect agricultural output, biodiversity and animal health. Scottish Government has supported controlling bracken using the pesticide Asulox. Between 2013 and 2023 Asulox was granted emergency authorisation for bracken control UK-wide. Repeated emergency authorisations raises questions about reliance on a product which does not meet approval criteria for standard authorisation.

## Flexible response

- The calldown was to synthesise evidence of the implications of not controlling bracken with asulam in Scotland.
- The response used a rapid/systematic review of academic and grey literature, and staff expertise to inform understanding of impacts of not controlling bracken with asulam on biodiversity, rural productivity and public health in Scotland.
- The review noted negative impacts of stopping continued emergency authorisation of asulam would be reduced options for bracken control, and concomitant loss of biodiversity and grazing land.
- Positive impacts would include the prevention of the herbicide and its breakdown products entering watercourses.

## Impact

- The evidence in the report on the Implications of not controlling bracken with asulam in Scotland was cited by the Cabinet Secretary in their decision that Asulox would not be authorised for use in 2023, published in June 2023.

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## Seedcorn

John Jones

Moredun Research Institute · SRUC · BioSS · The James Hutton Institute · University of Aberdeen, The Rowett Institute

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# UNC – Seedcorn funding

Seedcorn Funding is used to explore new areas of science that are strategically important to MRP and RESAS priorities

*"Maintaining and enhancing the science base for Scotland"*

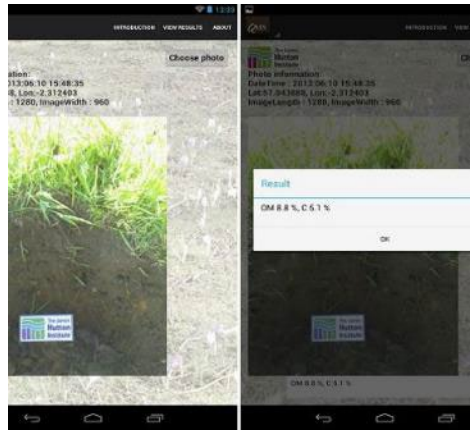
- Proof of concept projects (all)
- PhD studentships – training the next generation of scientists (all)
- Strategic partnerships (Hutton)

# Proof of concept projects

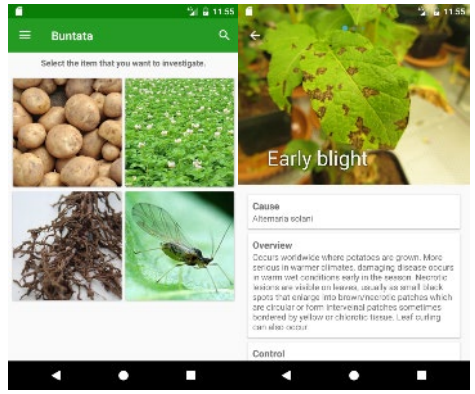
## Exploration of new areas

- **BioSS Topic Group Initiative**
  - Enables BioSS colleagues to collaborate with external partners in short- and mid- term projects to explore, experiment and establish new methods and approaches

- **Hutton “Seedcorn” awards**
  - Small (£20K) projects in new areas
  - Frequently aligned with strategically important areas
  - Pump-priming for future grant applications
  - *e.g* – award made to explore potential use of phone apps has allowed subsequent development of apps that increase impact of research activities



**SOCiT**
Analysis of soil composition




**BUNTATA**
Potato disease field ID

**GerminateScan**
Linking field phenotype to genotype data

# Proof of concept funding - impact

## Weaponising your FEC results!

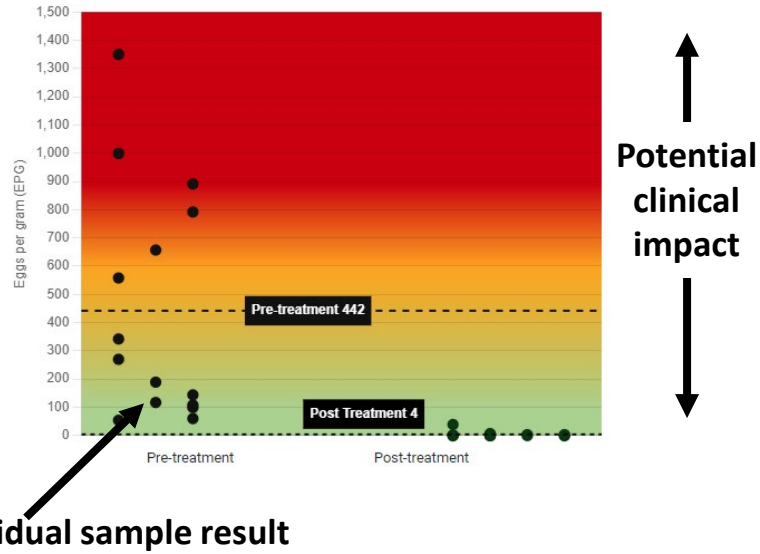
FEC check

A free online tool to visualise sheep faecal egg count results

- ✓ Know what results mean at a glance
- ✓ Translates numbers into a simple visual to aid decision making
- ✓ Assess sheep roundworm faecal egg counts (excluding *Haemonchus* cases)

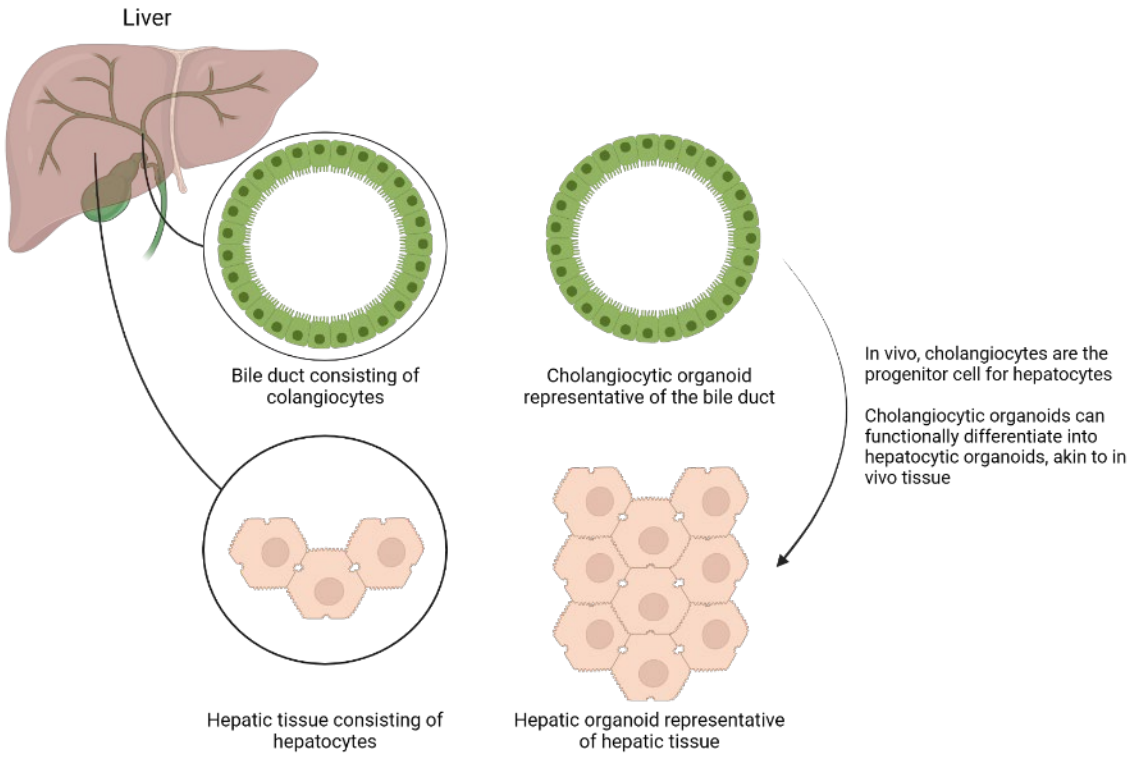
- ✓ Co-designed with sheep farmers, vets and advisors
- ➢ **Encouraging uptake of FEC testing**

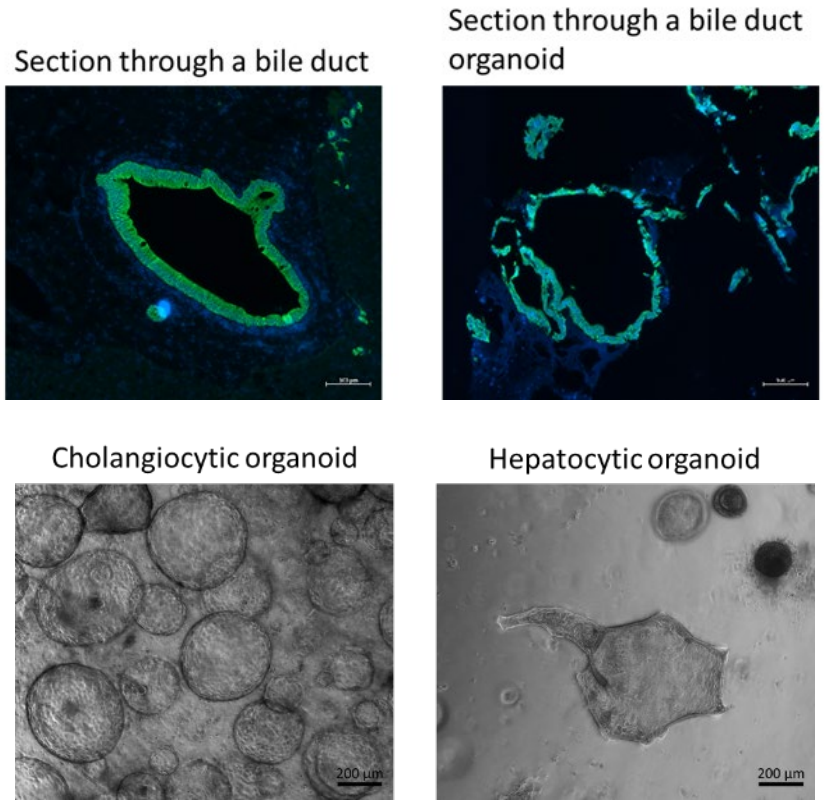
app.moredun.org.uk/fec



# Proof of concept funding - impact

**“*Mini livers*”: Ruminant liver organoids and their application in host:pathogen interactions research**




The developed organoids will be applied to model host:pathogen interactions between the liver fluke (*Fasciola hepatica*) and the host ruminant liver

# Postgraduate studentships

38 fully or partially funded studentships

- Leverages funding for a further 230 related studentships
  - Research Councils
  - Charities
  - EU funding
  - Overseas
- Development of new partnerships
  - UK
  - International
- SEFARI PhD showcase event facilitates collaboration across institutes

SRUC - Bats on Farms: Do More Trees = More Bats?

Hutton – mechanisms underpinning raspberry dormancy

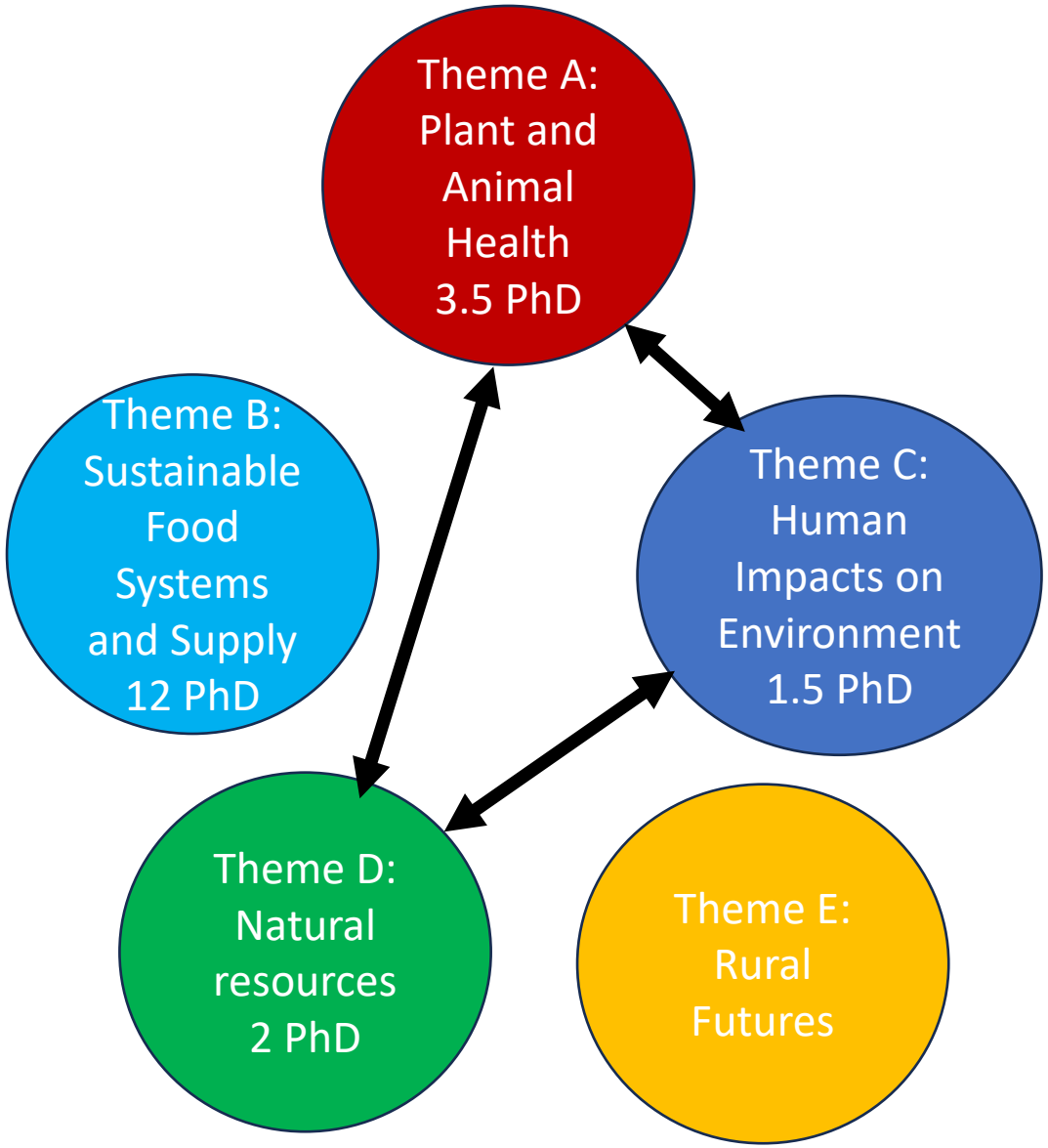

RBGE - Taxonomic Revision of the Torva Clade of Solanum

MRI - Sustainable parasite control strategies on managed sheep farms

# PhD studentships – exploring new areas

**PhD studentships allow investigation of new areas currently on the periphery of the SRP**

- Extends the reach of the SRP in a highly cost-effective manner
- Rapid and cost-effective way of investigating new areas of increasing importance (and likely to be included in the next SRP)
- Projects provide added value and can adapt more quickly than SRP projects pre-defined with milestones in 2021




Directly funded projects only
Arrows indicate cross-theme projects

# PhD studentships – training the next generation

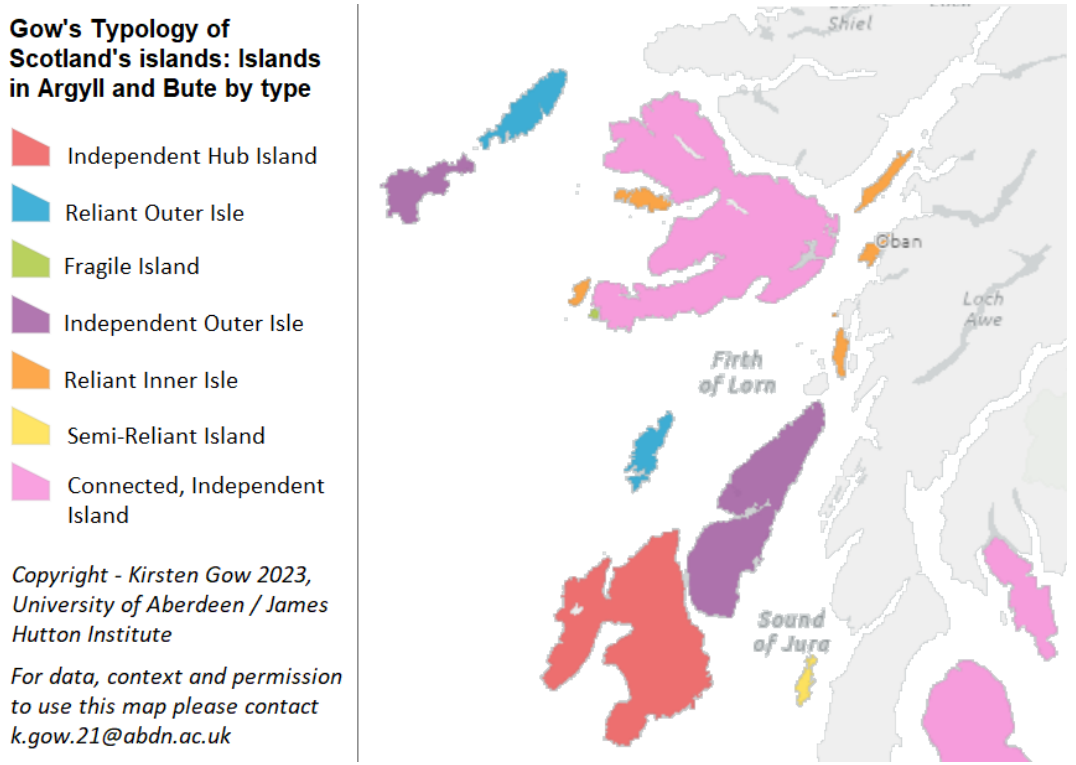
**Training new, highly skilled scientists**

**Addressing skills shortages - institutional**

- Bioinformatics
- Plant breeding

**Addressing skills and knowledge gaps - government**

- Training of scientists with knowledge of Rural Science
- Ex PhD students now working in DEFRA, Scottish Government
- Internships for policy relevant areas
    - Gow's Island Typography
    - Kirsten Clarke



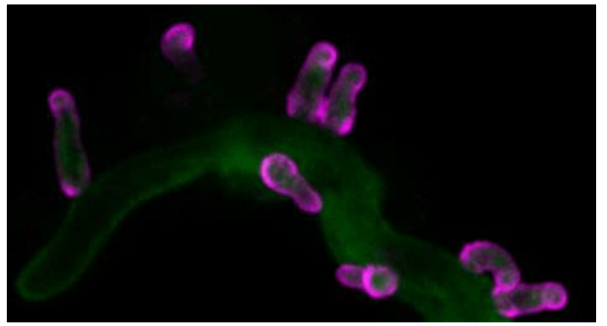
# PhD studentships – underpinning new funding

PhD studentships provide a means of exploring new scientific areas that allow significant awards in areas linked to SG research priorities

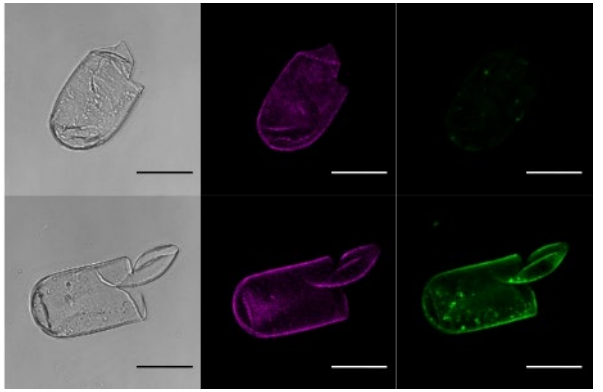
- Shumei Wang - mechanisms of effector delivery by plant pathogens
  - Novel mechanism of secretion of effectors by late blight pathogen
  - ERC Advanced grant (€2.5 million)
  - BBSRC IPA awards – linked to Syngenta (£900,000)

- Wenbin Guo – High throughput transcriptomic analysis
  - BBSRC awards totalling £1,075,400
  - Scottish Enterprise £200,000

- Suzanne Donn – tools for analysing soil nematode assemblages
  - Awards from NERC (£225,000), Innovate UK (£1.5 million) plus several large EU awards (€1 million)



Infection structures (haustoria) of *Phytophthora infestans*



Nematode eggshell protein

# PhD studentships – industry links

BARIToNE

- £5million BBSRC and industry funded CTP
- 18 industrial partners
- 42 studentships across 7 years
- **Underpinning and adding value to the TCD investment in Tayside**

- PhD student projects can lead to commercially important outcomes
- **Building the knowledge-based economy in Scotland**

# Seedcorn funding - partnerships

**Seedcorn funding is used to fund strategically important joint appointments**

- University of Dundee
- University of St Andrews
- (SRUC/SASA)
- CIP (International Potato Centre)

**New joint appointment with CIP (Amanpreet Kaur)**

- Allows SRP science base access to the world's largest potato germplasm collection
- Access to globally important expertise in all aspects of potato biology
- Critical mass in an area of importance to both organisations

CIP
INTERNATIONAL POTATO CENTER

# Partnerships – University of Dundee/Hutton

University of Dundee Division of Plant Sciences are co-located on the Hutton Invergowrie site

- A key strategic partnership for both organisations
- 55 UoD staff and students co-located with Hutton staff
- Complementary skills across the translational pipeline
  - A route to translation for UoD
  - Access to world leading science for Hutton
- Critical mass in Plant Sciences
  - Top ranked Plant Sciences Institution in the UK (REF21)
  - Huge scientific and translational impact
- **Place-based economic benefits to Tayside region**
  - Joint work underpins the £62 million TCRD investment
  - Joint funding bids - UKRI, Wolfson Trust, Garfield Weston, ALERT21 Infrastructure, FTMA
  - Dundee is a centre of excellence for life sciences

**Dundee Effector consortium**
A joint UoD/Hutton initiative

ADVANCED PLANT GROWTH CENTRE

TAYCITIES Smarter + Fairer

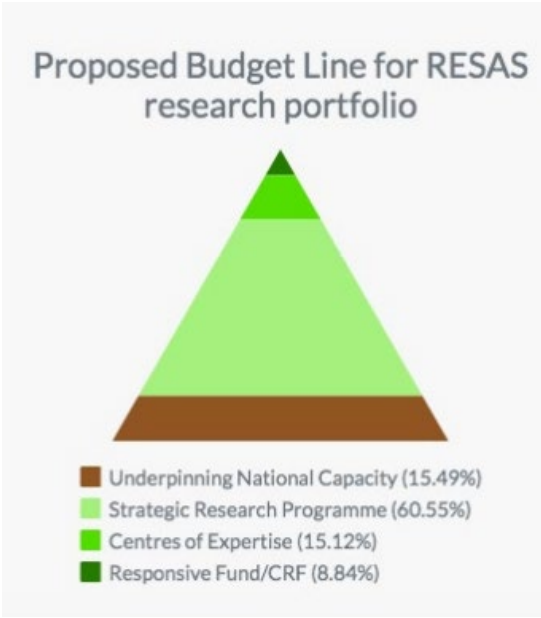
INTERNATIONAL BARLEY HUB

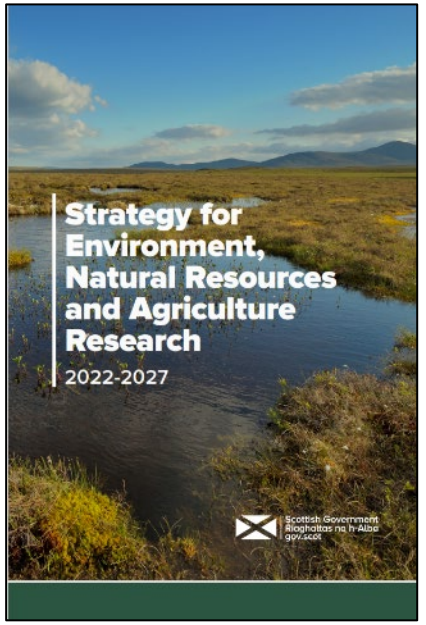
# Seedcorn funding - summary

Provides funding that underpins the longer-term financial sustainability of the MRPs

- Resilience
- Partnerships
- Exploration of new areas relevant to future SRP
- Generating data in support of funding proposals

- **Critical for the knowledge-based economy**




Long term funding at base

Scottish Government
Riaghaltas na h-Alba
gov.scot

# Underpinning National Capacity 2022-2027

# Platform Funding (Hutton; Moredun; BioSS)

SAB review 8th November 2024

Scottish Government
Riaghaltas na h-Alba
gov.scot

SEFARI
LEADING IDEAS
FOR BETTER LIVES

SEFARI

# Brief

The presentation will highlight how platform funding is supporting and maintaining the research base in Scotland.

## Moredun Research Institute
## James Hutton Institute
## BioSS

Excludes University MRPs (SRUC/Rowett) who get REF income, as their equivalent Platform funds, but many of the principles are the same

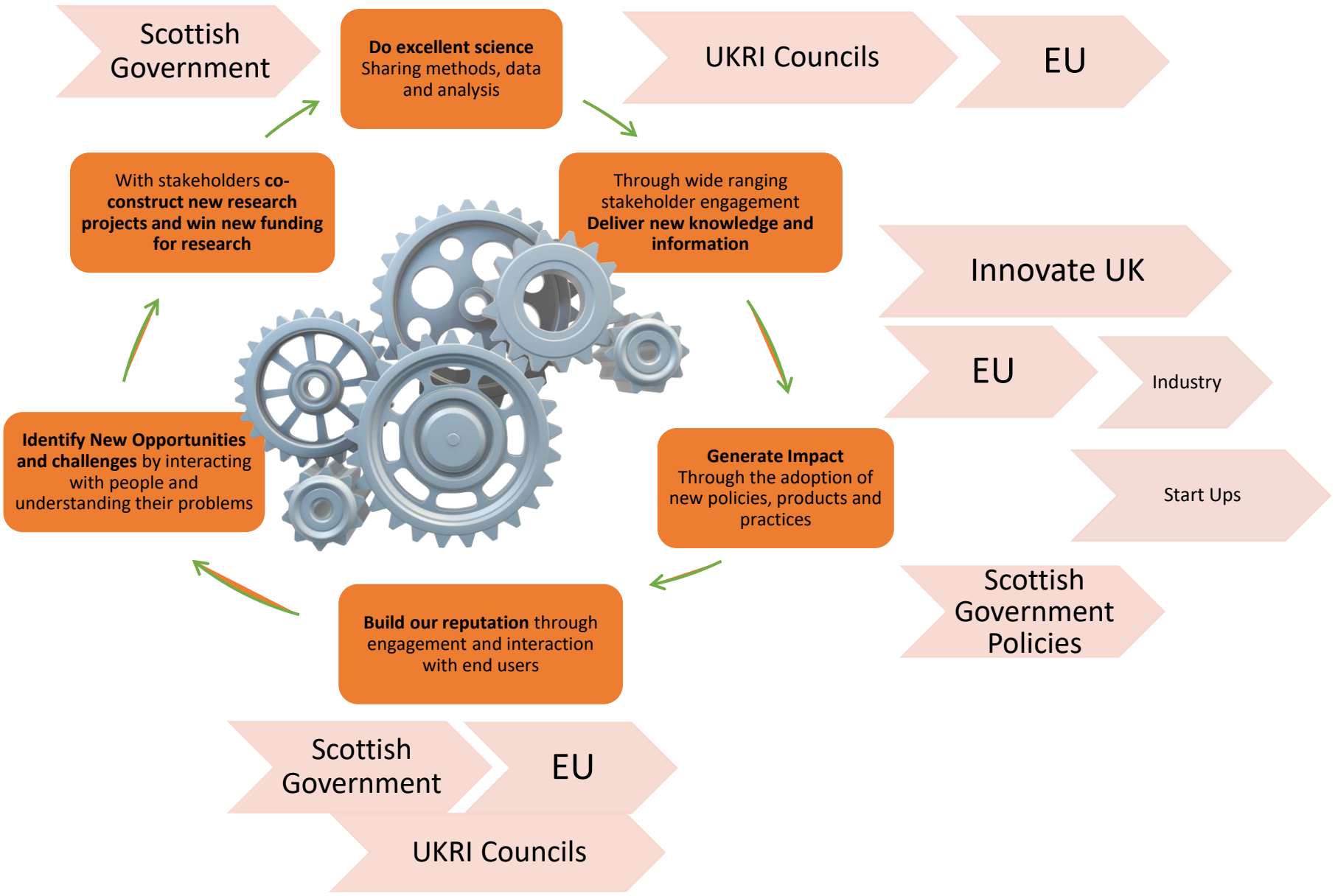
# UNC - Platform Funding

- Platform funding is to promote scientific and financial sustainability, filling the gap between the FEC overhead rates and the capped overhead rates offered to applicants for particular funding schemes, including bridging the gap where funding constraints applied to successful bids would otherwise have resulted in a financial shortfall.

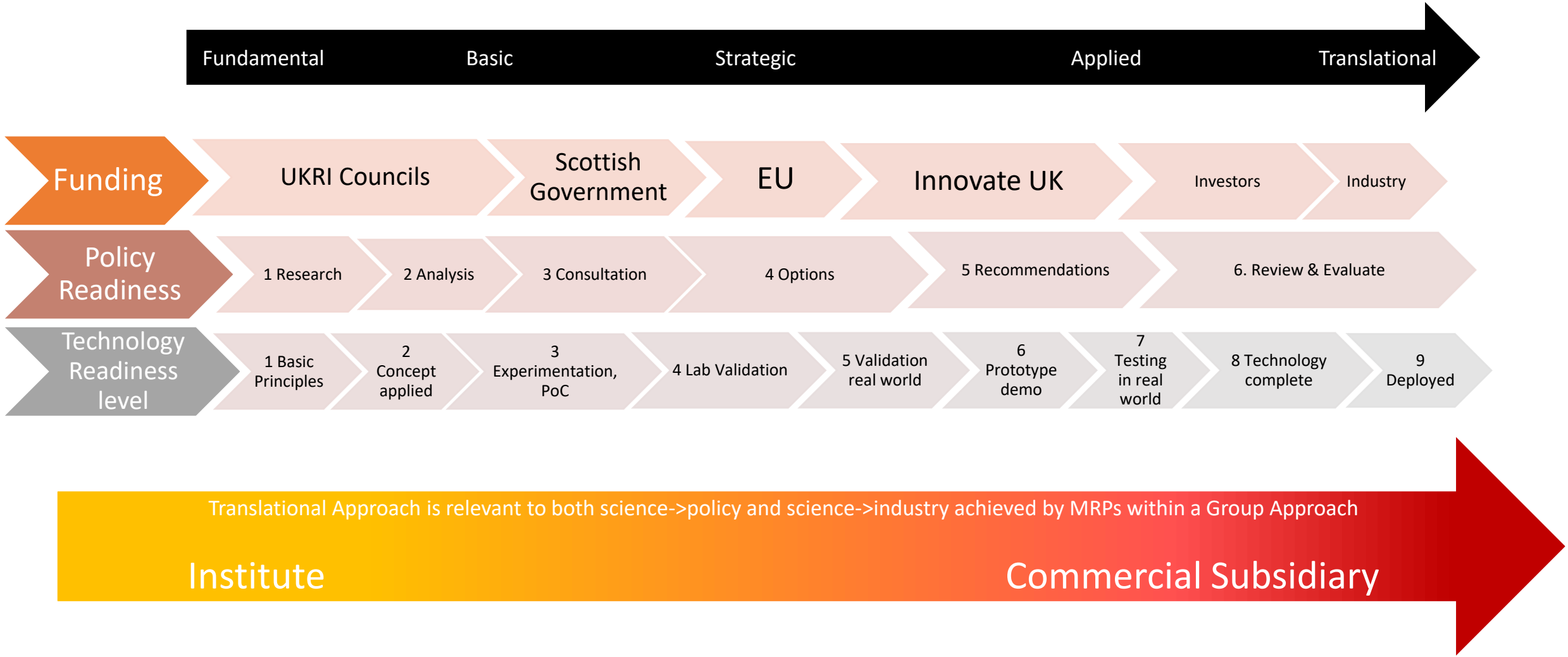
- UKRI and Innovate-UK are 80% FEC and EU is c.50-70% FEC; Charities - 20% or less

- To be eligible for Platform funding, projects must have current or future application to the RESAS portfolio of research and must also meet at least one of the following criteria:
    - develop an area of methodological research;
    - lead to development of capacity and skills in emerging application areas;
    - engender interaction with leading researchers or research groups; and
    - enhance reputation on national or international stages.

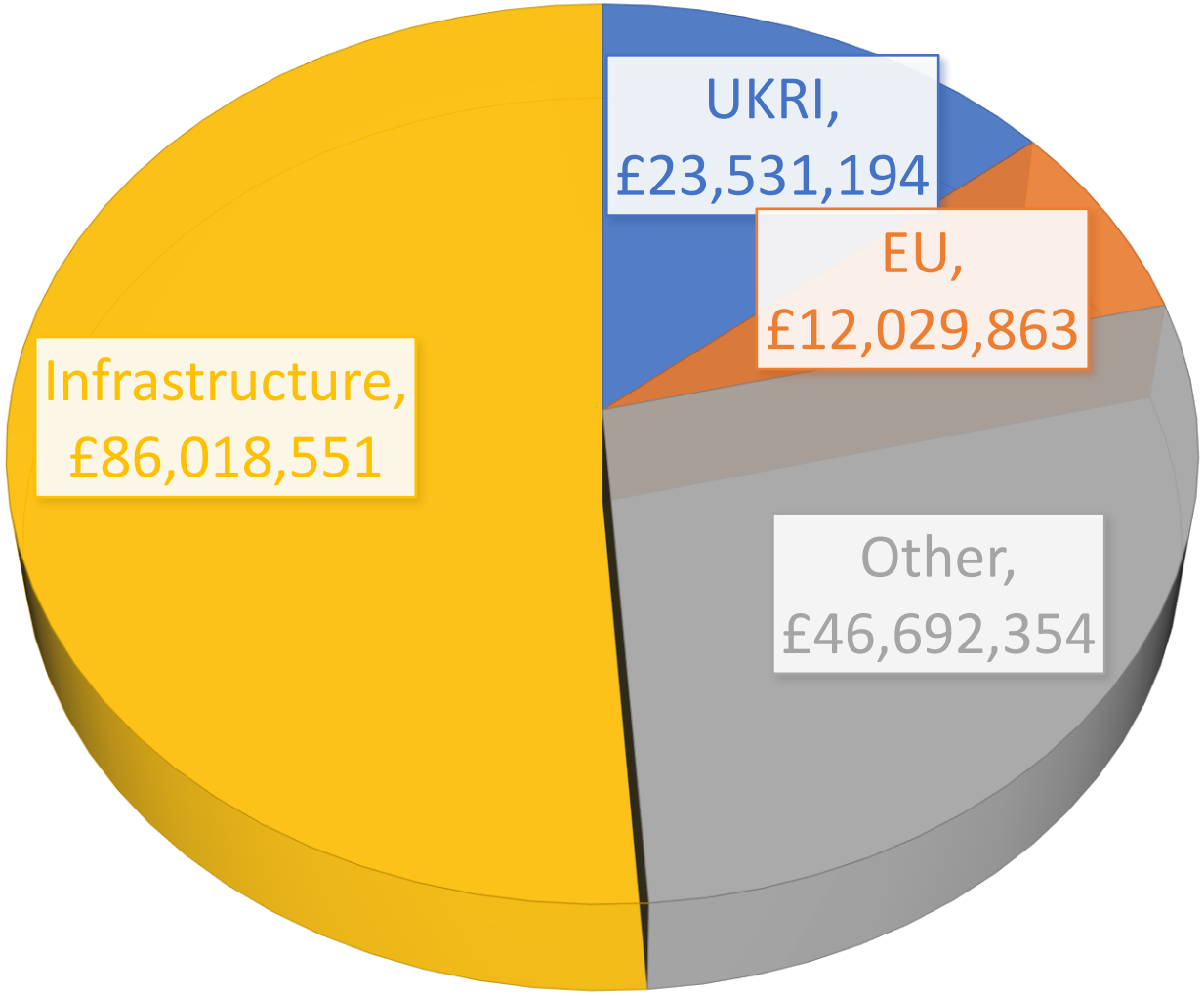
# Research Engine



# Not all funding does the same thing and funding from different sources complete the Translational Pipeline



# Net additional funding of the science base within current period of the programme



# International Reputation - Leverage of EU Horizon 2020 Research & Innovation Programme

Analysing the EU Funding Database using the two EU Thematic areas most aligned with SG Policy namely
1. Climate action, environment, resource efficiency and raw materials 2. Food security sustainable agriculture, forestry, marine, …

**Funding won by UK organisations**

60 organisations

€79m EU

The Top Three are:-

| | |
|---|---|
| 1st SEFARI Main Research Providers | €24.3m |
| 2nd U. Exeter | €20.7m |
| 3rd UKRI | €15.1m |

SEFARI MRPs are ranking 21st in Europe out of 9,463 organisations i.e. top 1%.

# A Policy Example - Transforming Land Use For Net Zero, Nature and People: The Land Use for Net Zero (LUNZ) Hub

## Four Nations | Big Tent


(Some of) the LUNZ Hub team

***Web:*** *LUNZHub.com*

High profile collaboration between UKRI, Defra, DESNZ and the 3 devolved administrations, co-led by the James Hutton Institute (2023-2027)

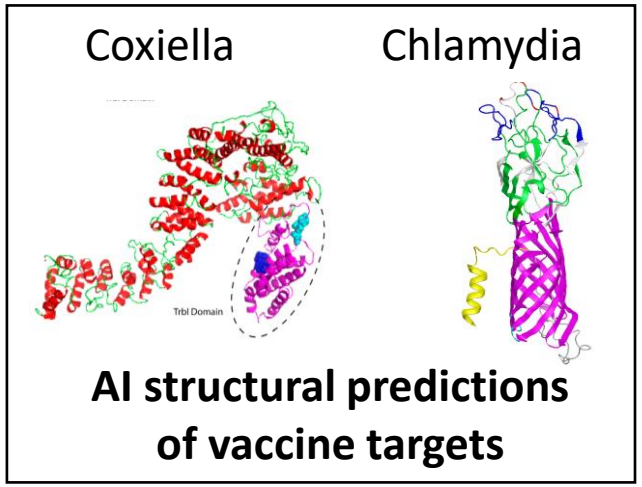
The Hub has:

- 34 member organisations, including agricultural advisory organisations, arms-length agencies, academics, green finance, NGOs and an arts collective
- 62 project partner organisations with committed support
- 4 national teams and one UK-wide team
- 7 Topic Advisory Groups:
  - Agricultural Systems
  - Soil Health and Carbon Dynamics
  - Land Use Change
  - Equity, Diversity and Inclusion, and Social Justice
  - Green Finance
  - Digital Opportunities
  - Enabling on-the-ground transition

UK Research and Innovation | Department for Environment Food & Rural Affairs | Department for Energy Security & Net Zero | Department for Science, Innovation, & Technology | Scottish Government Riaghaltas na h-Alba gov.scot

# Industry – Improved vaccines for sheep reproductive disease (REPRODIVAC)

- Current vaccines for important reproductive diseases of sheep (Chlamydia/Coxiella) unsafe and difficult to manufacture
- Working with industry to develop improved vaccines to ensure safety/more resilient supply
- Using latest structural biology/reverse vaccinology approaches to develop subunit vaccines + companion diagnostics
- Bringing a new subunit Chlamydia vaccine to market

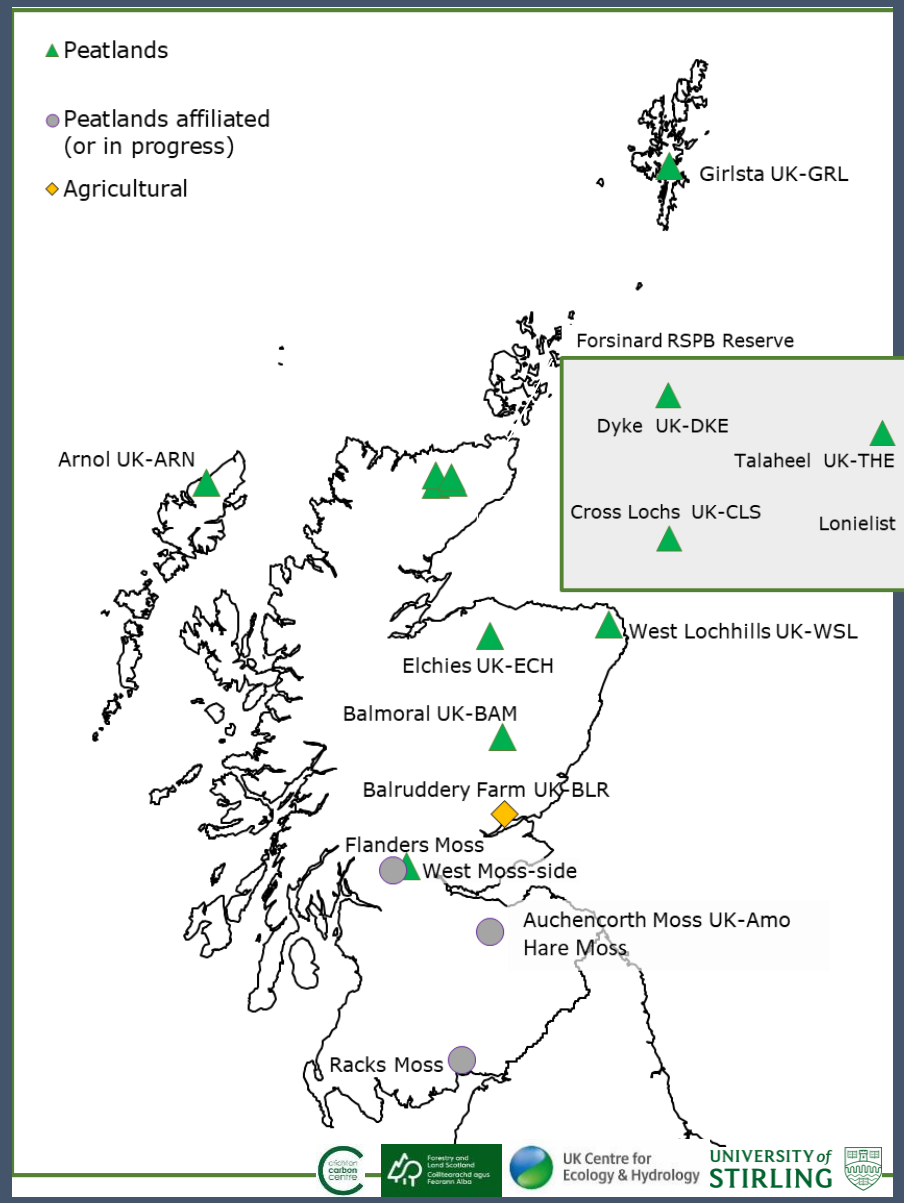

REPRODIVAC

Innovate UK

Horizon Europe

https://www.reprodivac.eu/

# National Capacity Example – A new UNC service - The Scottish GHG Network




- 14 peatland sites currently operating
- 1 agricultural mineral soil at Balruddery

- James Hutton Institute maintains and manages ten sites
- Team of five staff (4.2 FTE total)
  - Network manager, Relevant project leads/Pis, Data manager and analyst, Two field technicians
  - Funded by Scottish Government Underpinning National Capacity ; NatureScot; NERC; EU

Rebekka Artz, Mhairi Coyle *et al*.

# Benefits

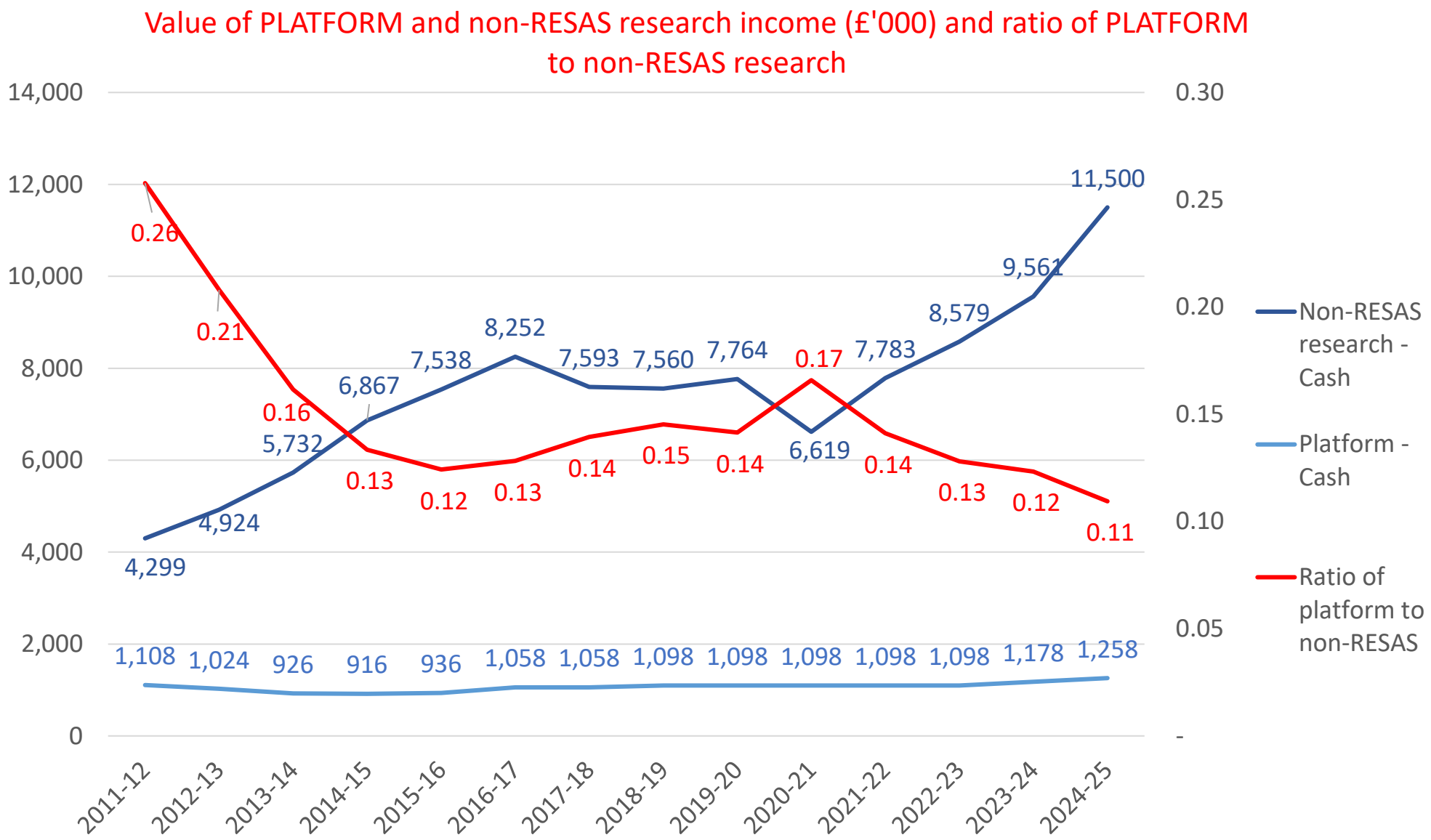
This levered income:-

- Sustains financial viability and diversity of the research providers in the research landscape by allowing them to undertake research at FEC minus
- Adds value to RESAS Portfolio with net additional science getting done that is aligned with the RESAS portfolio so that
  - Science has greater depth; replication; wider application; excellence; national and international reach; innovation; and enables wider comparison with rest of UK and Europe
- Mixed funding model provides complementarity and connects along the translational pipeline of ideas (UKRI; EU), innovation (Innovate UK; EU) and policy (UKRI, EU) so greater impact is achieved
- Builds capacity and networks with the UK, Europe and rest of the world
- Virtuous circle of sustaining Excellence that builds reputation to win more income, sustaining our national reputation as an invested Science nation that helps attracts talent, inward investment, jobs and companies to locate and stay in Scotland

# Risks

## Platform cannot sustain more FEC minus

Vicious cycle if platform doesn't grow with success



SEFARI

# Q&A

# Tall Tower - Scottish Observatory for Atmospheric Research (SOAR)

- £1m NERC strategic Capital grant to Edinburgh University and James Hutton Institute at Hutton's Balruddery Research Farm
- Samples air at various heights with sensors on tower and gas analysis in lab at the base
- Sensors for $CO_2$, $CH_4$ and CO to feed the Met Office's top-down emissions estimate models and wide range of climate forcing and ozone depleting gases