

Project	Focus and audience	Status	Outcome
<p>Precision Agriculture to drive production efficiency in Scottish sheep</p>	<p>The Scottish Government is committed to reducing greenhouse gas emissions and agriculture are one area where savings need to be made. It is acknowledged that improving animal health and welfare and thereby livestock production efficiency is one way to achieve this. Gastro-intestinal nematode infections rank as one of the top three production limiting endemic diseases of livestock, but uptake of sustainable control strategies/recommendations and/or diagnostics are still poor, and this project sought to help.</p> <p>Leaflet available here.</p> <p>Audience: Vets, vet nurses, farmers and the wider industry across Scotland and the UK.</p>	<p>Complete</p>	<p>Two workshops (Tomintoul, 8th March 2017 and Kelso, 16th June 2017) were designed and delivered. Developing and running these workshops allowed the team to improve their methods of delivering information and bringing about changes in behaviour to best practice. The experience also taught them more about what farmers want and need from best practice advice and support. The project changed farmer perceptions and behavioural intention about more sustainable methods of parasitic worm control in their sheep flocks and has the hope of changing long-term behaviour.</p>
<p>The Beauty of Roots Exhibition</p>	<p>The project was an innovative Art and Science Collaboration and the resulting Exhibition provided novel opportunities for public engagement through demonstrations of scientific and artistic processes. The exhibition was designed (a) to improve the public's appreciation of the beauty and complexity of roots and (b) to inform them of the essential roles of roots in environmental sustainability and food security by reference to work undertaken in the Scottish Government Strategic Research Programme.</p> <p>Blog available here.</p> <p>Audience: General Public.</p>	<p>Complete</p>	<p>The exhibition has been both successful and incredibly popular. Art work has been displayed at >5 venues (Exhibition, 17th-30th March 2017, Dalhousie Building, University of Dundee; SEFARI Showcase Event, 18th April 2017, Scottish Parliament, Edinburgh; Open Studio Event, 29th-30th April 2017, Jean Duncan's Studio, Fife; The Fascination of Plants Event, 21st May 2017, University of Dundee Botanic Gardens; Exhibition, August 2017, The SNH Conference Centre at Battleby).</p>

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"Gracing on the Edge" screenings	<p>The project communicated a cutting-edge, timely and collaborative research project, 'Transgrass', to influence post-Brexit government policy, parliamentary and public debate about the acute challenges in upland management. The film 'Grazing on the Edge' (a Transgrass output) was used to provoke debate. It was made collaboratively between researchers, crofters and the young farmers club on Skye and it illustrates what is under threat if the 6% of Scotland that is common grazings is not managed more strategically.</p> <p>Audience: Policy, Researchers and Crofters.</p>	Complete	The film generated important discussions (at Scottish Natural Heritage Great Glen House in Inverness, Saughton House and Southern Skye (March-June 2017) and (at times) a heated debate about the ecological connections with common grazings, the necessary directions for agri- environment research and policy and succeeded in highlighting the importance of researchers getting involved.
Metagenomics Workshop	<p>Metagenomics and metatranscriptomics are increasingly becoming important molecular tools for the identification of microbial communities that are non-culturable and associated with 'normal' and 'diseased' states. This allows the detection of changes in these communities, known as 'microbiota', during infection and disease, and hence the identification of microbes associated with specific disease syndromes. This technology is very timely and encourages inter-disciplinary and collaborative approaches. Key cross-disciplinary scientists from across the institutes were invited to participate in a workshop to provide an opportunity to identify new opportunities and actions in this area going forward.</p> <p>Audience: Researchers and Policy.</p>	Complete	This project involved the delivery of an interactive workshop (27 th April 2017) to look at all aspects of the technology covering methodology and key applications to encourage collaborations with leading scientists in the field. The over-subscribed event provided a great networking opportunity that has the potential to lead to new collaborations and research interactions in a key area of importance relating to animal and plant health and disease, environmental impact and mitigation of greenhouse gas emissions, which in turn could impact and inform Scottish Government policy.

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National Science Education Resource	<p>Science education is very important to enable greater participation and understanding of new approaches and technologies that can make a significant difference to our lives. SEFARI has a considerable resource in educational materials, activities and people that collectively can make a significant contribution to science education. The main aim of this project was for the Institutes to work collaboratively with colleagues involved in biology education at SSERC, to develop a National Science Education Resource where scientists and teachers can work together to inspire the next generation to become interested and hopefully take up careers in science going forward. During the COVID-19 pandemic, access to home learning resources has been essential and the project team have expanded upon this education remit.</p> <p>Leaflet available here.</p> <p>Audience: Teachers and Students.</p>	Complete – incorporated into ongoing educational activities	<p>Raised awareness of the excellent education resources available within SEFARI that can help support science teaching in Scottish Schools. Encouraged and developed key collaborations and sustainable working relationships between teachers and scientists, including at a very successful ‘Support for Higher Biology with SEFARI Researchers’ event at the Moredun Research Institute (16th November 2017) which received very positive feedback from a teacher ‘I was at the SEFARI support day yesterday. Just wanted to say it is worth keeping an eye out for courses with them, and the resources that they have on their website and will come through from the SEFARI initiative’ - (posted on a teacher’s mailing list).</p>
My Food, Our World	<p>The Scottish Government published its ‘Good Food Nation’ (GFN) consultation in 2014, setting out their ambitious vision for food in Scotland, from plough to plate. ‘My food, our world’ has created a cutting-edge online/digital content designed to reach a wide range of audiences, to demonstrate how the research undertaken by SEFARI is providing evidence to support the GFN.</p> <p>Audience: General Public, Policy etc.</p>	Complete - but still investigating widening access to the outputs via the SEFARI website	<p>A first look video of the project offered an interesting insight into SEFARI research and the interactive digital content was trialed at Food Matters Live, Excel, London (21st-23rd November 2017) where it proved incredibly popular and initiated a range of discussions with a number of visitors who attended the event.</p>

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Scotland's Biennial Agriculture and Environment Conference	<p>This biennial conference is the premier agri-environment conference in Scotland, attracting keynote speakers from Scottish Government Ministers and is attended by policy advisors, practitioner representatives and scientists from across Scotland, the UK and Europe. This conference sought to help inform and shape the debate about how best to reward farmers, foresters and other land managers for delivering public goods from their land management practices.</p> <p>Blog available here.</p> <p>Audience: Policy, Politicians, Researchers, UK and International.</p>	Complete	<p>The conference was held on 27th-29th November 2018 at Dynamic Earth in Edinburgh. SEFARI members presented their research and there was a dedicated poster display to highlight SEFARI outputs. Content was designed as highly relevant to Scottish Government policy and encouraged the discussion of interdisciplinary research. The conference was the largest forum highlighting research across SEFARI, it has societal value and relevance to international interests, and was extensively covered in the media.</p>
Trends in Swine Infectious Diseases	<p>Pigs are a fast-growing species with efficient feed conversion rates that play a crucial role in the efficiency of the livestock sector. Zoonotic and non-zoonotic epidemics can put food availability at risk. Providing a platform for stakeholders with significant expertise in pig diseases has the potential to establish new collaborations and research interactions in key areas of importance for Scotland and internationally. These areas include animal health and disease, agriculture resilience and food security, as well as reducing environmental impact of livestock production and mitigation of greenhouse gas emissions, which in turn will impact and inform Scottish Government Policy.</p> <p>Audience: Researchers and Industry.</p>	Complete	<p>The "Trends in Swine Infectious Diseases" event (3rd November 2017) brought together national and international researchers with significant expertise in pig diseases and controlling porcine infectious disease. The event proved attractive to both academia and industry (78 delegates). With plenty of networking opportunities, discussions were initiated on possible future collaborations. Relationships built during this event contributed to the desire for additional meetings e.g., the later Responsive Opportunity Funded 'Pig and Poultry – Optimizing Production' event.</p>

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<p>Cross SEFARI Film</p>	<p>A short film (approx. 5 mins) has been created to highlight high-impact SEFARI research and how we are working to help mitigate some of the major challenges facing Scotland, and beyond. Examples included taking a closer look at research on crops, livestock and our diets and how this work can improve yields, our health and the environment. The film (in collaboration with Circa Media) sought dynamic and innovative ways of communicating this information to enable the challenges, solutions and the scientists involved to be relatable and accessible to a diverse audience.</p> <p>Blog is available here.</p> <p>Audience: General Public.</p>	<p>Complete</p>	<p>The film is being shown on a continuous loop at the John Hope Gateway, Royal Botanic Garden Edinburgh. The Garden is visited by around a million people a year and offers the opportunity to engage a large diverse audience with SEFARI research. The film and edited clips are available SEFARI website homepage, and material generated has been used on social media and at a variety of events (e.g. parliament showcase). It has been well received by a diverse audience and across multiple stakeholder groups.</p>
<p>Schools soil poster competition</p>	<p>Encouraging young people to understand the importance of soils and the linkages between soils and the wider environment is vital to ensuring their future sustainable use and management. It is also important to provide support for teachers who may find teaching soils uninspiring. This project provided a focus for young people to explore the importance of soils and engage teachers in resources that are available to help them teach soils curriculum in an engaging way. A main focus of this project was also to run a fun interactive day (on World Soils Day, 3rd December 2017) with demonstrations and muddy activities for all ages at RBGE.</p> <p>Audience: Teachers, pupils and families.</p>	<p>Complete</p>	<p>A poster competition was open to both primary and secondary schools. The topic of the posters was “The importance of soils” and posters could be international in their focus or focus on issues relating to Scottish soils. The competition was promoted by Aberdeen Science Centre, Geobus and through the Scottish Association of Geography School Teachers. Three schools; Alloa Academy, St Peters Primary and Airyhall Primary entered the competition and prizes were awarded. A quote from a teacher “I never realized soils were that interesting”.</p>

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<p>Imaginative tools for visualising complexity</p>	<p>Complex, multidimensional, interconnected data can be extremely difficult to communicate effectively using classic visualisation tools. In this project the team recognised staff across SEFARI could benefit further by sharing best practice and building a cross-disciplinary community-of-practice in visualisation and this would be a timely way for everyone to benefit from existing expertise, and the development of prototype materials.</p> <p>Blog is available here.</p> <p>Audience: Cross-disciplinary researchers.</p>	<p>Complete</p>	<p>The workshop established a SEFARI community interested in visualisation techniques; created a space for people to share tools and methods; increased knowledge on how to produce examples of SEFARI research in easily understood, visually appealing, ways; and increased our capability to create high impact materials. The network not only gained interest within, but also external to SEFARI with the team creating their own blog forum.</p>
<p>Promoting climate change adaptation in catchments – an ecological art approach</p>	<p>Despite strong evidence from catchment science and from our deep experience in river management it is clear we must do more to involve stakeholders in taking adaptive action to the long-term challenges of climate change. Deploying effective means of communication is essential and we need to learn from experts from other fields. The project involved being a partner in an ecological-arts activity, working with the internationally famous artist Newton Harrison on a project in the Dee/Don river catchments. Newton Harrison of the Harrison Studio (USA) has championed art & ecology across the globe since the early 1960s. He has a track record in tackling land-use change for long-term resilience in socio-ecological systems.</p> <p>Audience: Key River Management Stakeholders.</p>	<p>Complete</p>	<p>This project provided an outstanding opportunity to work with top-level environmental communication experts to try to achieve changes in stakeholder thinking by generating high-quality professional communication materials and integrate fully with a high-profile arts-ecology project which was unique. The edited film of Newton’s presentation was completed in November 2017 and a launch event took place in March 2018. The materials generated amongst the research and practitioner community in natural flood management was presented at the Scotland Natural Flood Management Network and exhibited at 41st T.B. Macaulay Lecture: The challenge of sustainable development.</p>

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<p>No hitchhikers! Keeping clean for conservation</p>	<p>New and emerging diseases of plants and animals are one of the greatest threats to food security and natural resources today. These emergences are accelerating, driven by trade and human movement of plant and animal materials. Edinburgh is the arrival port for Scotland, and the SEFARI shared exhibition space at Royal Botanic Garden Edinburgh (the John Hope Gateway) is often one of the first stops for tourists before the Highlands and beyond.</p> <p>Blog is available here.</p> <p>Audience: General Public (e.g. tourists).</p>	<p>Complete</p>	<p>RBGE is visited by more than 900,000 people yearly, and each visitor physically interacts with a biosecurity footbath on entry. In creating an interactive museum installation, the project team have attempted to effect real change around biosecurity practice by engaging with visitors to explain how worldwide movements can transmit pests and diseases—and offered clear, practical and evidence-based advice on what they can do about it and show how personal choices can make a big difference.</p>
<p>Raising awareness of Strategic Research Programme impacts on tackling livestock related antimicrobial resistance challenges</p>	<p>Antimicrobial resistance (AMR) is the quintessential planetary One Health challenge and includes the problem of the careless use of antimicrobials (AM). In livestock, AMs are used for preventative and therapeutic purposes, but some evidence suggests that they are largely used in response to poor health/biosecurity. The aim of this project was to synergise and bring together the latest livestock related AMR research outputs from across SEFARI in order to contribute to solving the AMR challenge.</p> <p>Blog is available here.</p> <p>Audience: Researchers, Policy and Industry.</p>	<p>Complete</p>	<p>This project established a network of stakeholders that can assist in magnifying the impact of our research on various aspects of AMR. Researchers in this network later extended the legacy of this project via further funding which facilitated a further stakeholder event, produced a case study, booklet and enabled researchers to engage in the 6th World One Health Congress, the largest One Health event of 2020, where experts and researchers from around the world presented their latest scientific research and discussed the issues we still face.</p>

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Mathematical Modelling Demonstration Software: Animal Epidemic!	<p>Mathematical models are used within SEFARI as tools to understand and predict the spread and control of infectious disease. Communicating the concepts and outputs associated with these models to the public, farmers and industry stakeholders is a significant challenge, since the formal epidemiological, mathematical and computational concepts are highly technical. Interactive simulations with effective graphical interfaces can support public understanding and engagement with mathematical models.</p> <p>Blog is available here.</p> <p>Audience: General public, policy.</p>	Complete	<p>The project team developed a web app to facilitate interactive visualisation of exemplar disease systems, based around the devastating foot and mouth outbreak. This app has been used at numerous events (e.g. Royal Highland Show) to support public engagement and knowledge exchange activities to promote wider awareness and understanding of SEFARI work. With the subsequent COVID-19 pandemic, it is clear that initiatives like this have become even more valuable in better understanding how models can help in a crisis.</p>
Virtual Reality movie: Experience how peatland restoration in Scotland contributes to climate change mitigation	<p>Peatland restoration is one of the major policy interventions in Scotland's Climate Change Plan, with a target of 20,000 hectares per year. Peatlands in good condition are net carbon sinks, while degraded sites can emit substantial amounts of carbon, contributing to climate change. Since the start of this millennium, over £10 million has been spent on publicly funded restoration projects in an effort to reduce Scotland's net carbon emissions.</p> <p>Blog is available here.</p> <p>Audience: General public, policy.</p>	Complete	<p>This project showcased (via a new 360° film) how much peatland restoration contributes to climate change mitigation and how collaborative SEFARI partners' (James Hutton Institute, Scotland's Rural College and Royal Botanic Garden Edinburgh) ongoing research contributes. This film was premiered at a major conference (IUCN Peatland Programme 2018) and has been made available via NatureScot to facilitate wider access.</p>

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<p>“Microbes: Your food and your health”</p>	<p>The focus of this project is in line with Scotland’s Good Food Nation initiative. The relationship between the public, the foods they consume, and their digestive health is currently a high priority within Scottish Government. It is important to engage children and young people, so they can have a better understanding of the role that microbes play in their diet and general well-being at an early stage. In particular, this project has developed on-line educational resources focusing on microbes and their impact (both good and bad) on people’s lives.</p> <p>Case Study in progress.</p> <p>Audience: Children, families, pupils and teachers.</p>	<p>Complete – but extended</p>	<p>A variety of educational resources based around microbes suitable (and Scottish Curriculum for Excellence linked) for both primary and secondary schools were prepared and showcased at public engagement events, e.g., Royal Highland Show. The project team are extending their work and to launch a microbe website in 2021. With the COVID-19 pandemic, it is clear that this topic and the educational materials generated as part of this project are extremely valuable and this has also led to the creation of an additional resource on the science behind COVID-19 testing for higher biology students.</p>
<p>Protecting Potatoes</p>	<p>Potatoes are a staple food of nutritional and economic importance to Scotland. Potato diseases cause significant losses, with late blight alone responsible for an estimated US\$6.7 billion global annual loss. Climate change also threatens yields. Consequently, potato breeders need to stay one step ahead of the threats. The genetic resource of potato wild relatives offers breeders a wide variety of useful traits to tackle these challenges. Scotland is a world leader in potato research and maintains one of the world’s largest collections of potato wild relatives.</p> <p>Blog is available here & Case Study is available here.</p> <p>Audience: General public.</p>	<p>Complete</p>	<p>The project team created and displayed a Commonwealth Potato Collection (CPC) linked exhibit at the Royal Botanic Garden Edinburgh. The exhibit had two living plant displays during consecutive summers, created new interpretation panels that can be reused at other events e.g. Potatoes in Practice and led to effective collaboration between partners to bring leading Scottish research to a wider audience. The project received extensive media coverage and was covered by BBC’s Landward.</p>

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<p>Climate Change Projections for Scotland</p>	<p>The climate projections (UKCP18) form the basis of UK and Scottish Government policy and the data will underpin the work of policy, business and academia throughout the period up to the 2023 stocktake in the Paris Agreement on Climate Change. Whilst the projections are a powerful tool for impacts reduction and adaptation planning, there was a requirement for evaluation and a clear understanding of the issues concerning their use in Scotland.</p> <p>Blog is available here.</p> <p>Audience: Policy, researchers, government officials, private sector.</p>	<p>Complete</p>	<p>This project team held a workshop to directly engage key stakeholders (research, policy, agencies, local authorities and the private sector) and create a network to help improve the utility and use of the projections for risk assessments, impacts limitation and adaptation benefits. The team had previous experience that there are numerous issues with using the data and communicating the information and were able to improve understanding of the data quality, uncertainty, and spatial variation, and the means by which these issues manifest themselves.</p>
<p>Scotland's Dinner Plate 2050</p>	<p>Food and drink production are of major importance to the economic and societal wellbeing of Scotland and our trading partners. Despite being thought of, and promoted as, a land of premium quality food and drink we have a poor diet and a high incidence of associated diseases such as CVD, type II diabetes and certain cancers. However, SEFARI led or supported innovation is leading the way in helping to establish what will be our diet in 2050 and investigate the impact of these innovations on the health and wealth of Scotland.</p> <p>Case study is available here.</p> <p>Audience: Policy, Industry, Researchers.</p>	<p>Complete</p>	<p>A workshop was delivered and the presentations from stakeholders across the industrial and academic landscape identified that the industry is in good shape but that there are several challenges to be faced at the political, economic, environmental and consumer levels. It is clear, for example, that the implications of climate change can offer opportunities in terms of new crops, e.g. protein crops, but that weather extremes make crop agriculture challenging. Greater engagement with the SEFARI institutes will be utilised to develop adaptation and/or mitigation strategies.</p>

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<p>Managing river flows for climate resilience – storyboard development</p>	<p>Flooding and flood management is a key research area. This project is aiming to help people understand how river catchments work. Key themes will be the connections in river catchments: how actions in one area have effects lower down and the societal and economic benefits that arise from a healthy catchment system. More specifically a film will cover the effects of historical change on water runoff; how we can make natural interventions e.g. through tree planting, soil management and channel realignment to slow flows and so contribute to flood risk management; the implications of climate change on flows and the importance of establishing long-term resilience to this.</p> <p>Audience: General public, policy.</p>	<p>Storyboard complete</p>	<p>The Easter Beltie Restoration project is now underway and filming is taking place to address the focus of this project. The restoration is returning a straightened agricultural stream to a natural meandering course, in a bid to improve habitats for nature. It is the only project of its kind in the north east of Scotland, and will create a new, two-kilometre stretch of river corridor and ten hectares of floodplain rich in habitats where nature can thrive – gaining strong media interest. A Case Study is in preparation.</p>
<p>Food Forever</p>	<p>Producing enough food is one of the most fundamental challenges we face. Farmers are dealing with a growing number of pests and diseases, and climate models predict more frequent extreme weather events. Food Forever recognises what we eat connects us to the rest of the world and will be presenting messages that highlight global issues with local solutions.</p> <p>In collaboration with The Crop Trust and the Royal Botanic Garden Edinburgh (RBGE), a Food Forever touring exhibition was planned to highlight the role of plant and animal diversity as the foundation of resilience and greater food security.</p> <p>Food Forever Toolkit is available here.</p> <p>Audience: General public, policy, international.</p>	<p>Complete</p>	<p>The Food Forever exhibition was shown for free at RBGE for three months and included portraits of scientists, farmers and chefs working to ensure that we protect the vast, colourful spectrum of diversity in our food. Six of the eighteen portraits featured people who work for SEFARI. The exhibition was displayed at several other locations (e.g., Royal Highland Show, Saughton House) and directly led to Mairi Gougeon visiting the Rowett Institute in Aberdeen to meet Dr Madalina Neacsu. The exhibit was designed so it can be toured across the world.</p>

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Developing Sheep Scab Best Practice Cartoon	<p>Sheep scab is a highly contagious disease of sheep caused by the ectoparasitic mite <i>Psoroptes ovis</i>. The disease is endemic in the UK and notifiable in Scotland and has significant economic impact through its effects on performance and animal welfare. Diagnosis of sheep scab has historically been achieved through observation of clinical signs, e.g. itching, pruritis and wool loss and the detection of mites in skin scrapings. However, early stages of infestation are difficult to diagnose and sub-clinical animals can be a major factor in disease spread. SEFARI scientists have developed an ELISA test, which can detect sheep scab even in sub-clinical cases but for the test to have maximum possible impact in terms of control it is crucial that it is applied correctly.</p> <p>Case Study is available here.</p> <p>Audience: Farmers, vets, industry.</p>	Complete	<p>This project developed a series of animated storyboards (cartoon strips) and a 'Stop the Spread' animation, to disseminate advice for the test and expand on key messages related to control and best practice for the sheep scab test. The team worked closely with industry colleagues to develop clear, engaging, storyboard animations that could successfully communicate messages to end users. Researchers are continuing to monitor the uptake of the sheep scab ELISA test and ultimately establish if there has been an increase in best practice. It is planned this approach will be extended to the rest of the UK.</p>
Developing a Thematic Framework for Scotland's Biodiversity Research	<p>We are facing a biodiversity crisis as well as a climate change crisis. The aim of this project was to bring together key stakeholders with an interest in Scotland's biodiversity research to see whether we can identify a number of major themes around which our research effort can in future be structured. This will help to enhance the impact of our collective biodiversity work within Scotland.</p> <p>Full report is available here.</p> <p>Audience: Cross-disciplinary researchers.</p>	Complete	<p>A workshop with representatives from some of Scotland's main biodiversity research stakeholders was held at the Royal Botanic Garden Edinburgh. The workshop consisted of 4 themes:</p> <ul style="list-style-type: none"> • Scotland's Biodiversity Research 2021-2026. • Identifying research priorities, needs and gaps. • Identifying major themes. • Engaging stakeholders. <p>This project provided the opportunity to examine a strategic research focus.</p>

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Islands Revival Exploring the Potential for Repopulation	<p>SEFARI research has suggested a decline of 25% in total population and one-third in the working age population in sparsely populated areas of Scotland by 2046. The key driver of this trend is the legacy effect of out-migration of working age people in previous decades. The only effective way to reverse this trajectory would be substantial net migration. There is some recent evidence the demographic tide may be turning, but this is mostly informal and piecemeal, and it is crucial that rural policy and strategic planning are informed by current realities and ‘future-proofed foresight’ in order to respond effectively.</p> <p>Blog is available here & Case Study is available here.</p> <p>Audience: Rural and island communities, policy.</p>	Complete	<p>A workshop engaged a total of 33 representatives from island community groups (in Scotland and internationally), local government, island researchers, representatives from HIE, UHI, COSLA, the Scottish Islands Federation and the Scottish Rural Network. A strong online forum for community development was created, which received media coverage (e.g. BBC) and led to the island revival declaration. The project was so successful that SEFARI Gateway encouraged and supported continuation – Research on the Edge.</p>
High Performance Computing for Innovative Science	<p>High Performance Computing (HPC) is making major contributions across a wide breadth of scientific disciplines. HPC facilities are key to advanced data processing for data visualization, mathematical modelling, data simulations and computational biology (genomics, proteomics, metagenomics and metabolomics). There are many research staff within the SEFARI institutes with expertise in HPC and would benefit from working collaboratively to plan for future developments and to be able to share best practice.</p> <p>Blog is available here.</p> <p>Audience: Cross-disciplinary researchers.</p>	Complete – 2 nd ROF recently awarded	<p>A workshop enabled forty scientists and system administrators to come together to share their experience in a unique and inspiring day full of talks and discussions on using high-performance computing for science. The project team received an enthusiastic buy-in of developing an ongoing network of scientists and system administrators to share expertise and best practice. Such a network will help to improve big data research and practice across the SEFARI, and the importance of the network is reflected in the recent additional award.</p>

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<p>Intercropping in practice from research to on-farm trails</p>	<p>Crop diversification is a key component of Scottish, UK and EU strategies for enhancing agricultural sustainability and to secure production of agricultural commodities. Crop diversity can be increased by intercropping, i.e. growing two or more crop species together. Intercropping has potential to improve crop resource use efficiency, yield stability and resilience to pest and diseases and climate stress. Despite this intercropping is not practiced widely in Scotland or many parts of Europe. Our recent research can be shared to promote the uptake of intercropping within farming community.</p> <p>Blog is available here & Case study is available here.</p> <p>Audience: Farming community.</p>	<p>Complete</p>	<p>The project enabled researchers to hold a ‘field lab’ event on the island of Lismore and discuss the potential of growing different crops together to increase yield, reduce inputs, tackle pests and improve soil health directly with crofters. Support from the Responsive Opportunity Fund enabled crofters from across the Highlands to attend the event. A new short film was also produced as a source of information and practical advice for newcomers to cereal-based intercropping on how to sow, manage and harvest intercrops.</p>
<p>Development of new tools to facilitate healthier and greener online grocery shopping lists</p>	<p>Despite national dietary guidelines, our typical diet still contains too many calories saturated fat, salt and sugar, whilst having insufficient amounts of fibre, fruits, vegetables and fish - but making sense of all these messages isn’t easy. In recent years, sustainable diets are increasingly being promoted as a way to reduce the impact of human activities on the planet as well as to improve health. A food swap tool underpinned by robust nutrition science, or underwritten by policy bodies, that considers personal choice, the carbon footprint of foods, or indeed affordability would help consumers.</p> <p>Blog is available here.</p> <p>Audience: Consumers, supermarkets, policy.</p>	<p>Initial scoping is complete, 2nd ROF award is facilitating further testing</p>	<p>The Food swap algorithm and a basic interface is now working. The team’s current focus is to develop the ability for users to enter their own shopping lists for swaps to be suggested. Interesting, exploratory analyses is providing insights into the most important healthier, greener and affordable food swaps which could be applied for the development of messages that explain the rationale of the proposed swaps to the individual consumers. The team are currently preparing a scientific paper on their findings alongside further developing the tool.</p>

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<p>A celebration of barley: 2020 Vision</p>	<p>Barley is Scotland's most important crop and is underpinned by a world leading Scottish research community with strong end-user demand. However, now we must address the challenges of producing more food with fewer inputs, and an unpredictable climate. This project sought to partner with all barley stakeholders (from agronomy, breeding, crop protection, government, charitable trusts, environment and conservation, food and drink) to celebrate barley research and provide a forum for stakeholder input to identify priorities and inform research plans for the next funding programme.</p> <p>Audience: researchers, growers, conservationists, industry, policy etc.</p>	<p>Complete</p>	<p>The project team held a 2-day meeting in Dunkeld (February 2020), which provided the opportunity for 108 stakeholders, from across the barley supply chain, to communicate the depth and breadth of Scottish barley research and to discuss stakeholders' priorities to create a collective vision for the future. A Summary report of the meeting can be found here. Together participants discussed and formulated their key research priorities for over the next 5 and 10 years, creating a road map. A case study is also underway.</p>
<p>Waterwalls: Citizen stories of Scotland's waters</p>	<p>The Scottish Government designated 2020 as Scotland's Year of Coasts and Waters, with the objective of promoting experience and enjoyment of Scotland's coastal landscape and waters. This project aimed to create a Waterwall, a means for the public to tell their stories (in narratives and photographs) of its coasts and waters. The stories could be place-based or interest-based, snapshots in time, or temporal (e.g., same view at different times of day or season, water features under changing weather conditions) and activities were planned to be supported by an extensive programme of public events during 2020.</p> <p>Audience: public (citizens, visitors, families etc.)</p>	<p>Waterwall platform is complete and the team are scoping further uses</p>	<p>The Waterwall went live in Spring 2020 and around 122 images from across the whole of Scotland have been uploaded. Initial planned public events didn't proceed due to COVID-19 restrictions. However, the platform proved a useful form of escapism during lockdown and it is hoped material can be used for the Edinburgh Science Festival (Summer 2021) and COP26 (November 2021). For example, the project team are gathering materials for a short film tour of Scotland and are investigating adapting the existing Waterwall platform to create mini-clips of climate-related water research and activities.</p>

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Pig and Poultry Industry Day	<p>The pig and poultry sectors are major contributors to UK and global food security targets: The ambition for the Scottish pig sector is to double the value of the sector by 2030, while 50% of meat consumed in the UK is poultry. SEFARI have a number of research projects and capabilities that are relevant to the pig and poultry industry to help drive improvements in productivity, animal health and welfare, and sustainability. The “Pig and Poultry Industry Day” aimed to bring together stakeholders to exchange knowledge, showcase capabilities, and establish future research collaborations.</p> <p>Case Study is available here.</p> <p>Audience: Researchers, Industry.</p>	Complete	<p>Over 100 delegates attended the event in January 2020 and representatives from the animal health and nutrition industries, producers, veterinarians, academic researchers and government officials were present. The industry focused event enabled SEFARI scientists to further develop their understanding, and ensure their focus and outputs remain aligned with industry needs. It also provided an excellent opportunity for the industry to engage with and learn more about SEFARI research projects and strengthen and increase collaborative relationships.</p>
A Taste of Plants	<p>Future food systems will face unique challenges in order to meet the nutritional needs of an increasing population and current lifestyle choices. One important issue will be catering for an increased demand for proteins, while confronting growing environmental challenges and it is widely recognised that collaborative efforts from a variety of stakeholders are needed to ensure access to healthy and sustainable diets for generations to come. This project will focus how our research contributes towards food diversification, sustainable growth of the circular economy and healthy ecosystems.</p> <p>Blog is available here.</p> <p>Audience: Local community, growers, producers, policy.</p>	Complete	<p>The project team engaged consumers and those connected with the food supply chain (30 stakeholders) in February 2020 with our research on crops such as green pea, fava bean, hemp and buckwheat. A recipe book, video, and networking event were developed to provide a novel and informed perspective on ‘A Taste of Plants.’ Materials were also used at Arable Scotland 2020 and the project contributed towards the project team’s lead being awarded the Principal’s Prize for Research for Research and Engagement.</p>

Project	Focus and audience	Status	Outcome
Diet Detectives	<p>The Scottish Government has declared a climate emergency and has bold goals to achieve net zero emissions by 2045, and to reduce emissions by 75% by 2030. Food and food production can have an impact on both the environment and the climate, and it has never been more important to look at food choices and the production of our food. It has been estimated that the food supply chain contributes to a quarter of anthropogenic GHG emissions, and as everyone must eat, simple changes in food choices and behaviour could make a significant difference. New educational resources could help & they are the focus of this project.</p> <p>Blog is available here.</p> <p>Audience: Pupils, teachers, families.</p>	Complete	<p>A new 'Diet Detectives' educational resource was created which is based around learners creating three plates of food; choosing their favourite foods, creating a healthy balance plate as well as a plate of food to keep the planet healthy. The resource was planned to be launched at the Edinburgh Science Festival 2020, but a COVID-19 lockdown prevented this. However, this only increased the need to provide a health and nutrition activity that could be used at home. Therefore, Diet Detectives was quickly adapted to provide a, free to access, resource without compromising on quality.</p>
Food for thought – Scottish Livestock and their Keepers within our Scottish Landscapes	<p>Emerging global challenges such as the need to provide sustainable, nutritious food from our limited land resources requires a strong evidence base and a clear understanding of the science and potential issues that surround the various topics related to food production in Scotland. Never has there been a more urgent need to deliver clear facts based on sound evidence in the livestock sector. This project brings together a team with common interests using a novel communication method and a transdisciplinary approach.</p> <p>Blog is available here.</p> <p>Audience: Public, Farmers.</p>	Nearing Completion	<p>The team has brought (albeit virtually rather than face-to-face due to COVID-19 restrictions) selected SEFARI scientists, with complementary interests, expertise and perspectives, together with identified farmer Key Opinion Leaders and acknowledged communications experts to discuss and distil the key messages needed. A 'one-stop' farm shop gateway, to visualise the Top Ten topics identified, links to relevant research & info, key contacts etc. is now being developed in response to the issues and during ongoing restrictions on public events.</p>

Project	Focus and audience	Status	Outcome
<p>Hemp – Realising Scotland’s Net Zero Ambition</p>	<p>Emerging global challenges have created the need to develop environmental and political solutions that will deliver a more sustainable economy for Scotland. Key to this strategy will be the necessity to bring actors together with common interests and more than ever, the prerequisite to success will be a truly transdisciplinary approach. An opportunity to create a low carbon and responsible industry has arisen through utilisation of an ancient crop: hemp. While SEFARI scientists have already built a strong network, wider stakeholder engagement and education is still needed.</p> <p>Audience: Craft & artisan food makers, researchers.</p>	<p>Complete</p>	<p>The team adapted their plans from a face-to-face event (March 2020) to an online event (November 2020) due to the COVID-19 crisis. The event still succeeded in bringing together a cross-disciplinary range of stakeholders to facilitate innovative engagement on the topic of hemp. A blog on ‘hemp’s role in diet diversification and reducing greenhouse gas emissions’, an article on the Barn Arts web-site and a series of online hemp facts supported the event and have increased the project’s reach.</p>
<p>Workshop: 3D RNA-seq App – A flexible and powerful tool for differential expression and alternative splicing analysis of RNA-seq data for biologists</p>	<p>Scientists use a range of technical methods including RNA-sequencing, which has been widely used for differential gene expression and alternative splicing analysis. However, biologists can still get frustrated by the analysis and as a result the project team have developed a 3D RNA-seq App to provide a user-friendly interface for biologists and enable them to implement the entire analysis on a web-browser. The App has won the Best Innovation Award in School of Life Sciences, University of Dundee and it already has 1,860 users from across 53 countries.</p> <p>Audience: Researchers, students.</p>	<p>Complete</p>	<p>The project team delivered a virtual workshop in November 2020 (revised from a face-to-face planned workshop in May due to COVID-19 restrictions). The goal was to train participants (14) in the effective use of 3D RNA-seq and empower them to perform complex differential expression and alternative splicing analyses to produce experimental results in a fast, robust and reproducible way. A report can be viewed here and a case study is underway.</p>

Project	Focus and audience	Status	Outcome
Towards Inclusive Growth	<p>Inclusive Growth is of significant policy and academic interest in Scotland and the UK. It is one of four priorities within the Scottish Government’s Economic Framework and is a stated goal of regional development strategies, including Regional Growth Deals. The term broadly describes how economic growth is distributed: a neglected issue, and the concept is increasing governments’ attention on socio-economic problems. However, research involving practitioners and policymakers in Scotland has found Inclusive Growth to be poorly understood and difficult to measure.</p> <p>Blogs: ‘better understanding of’ & ‘what makes up’ Inclusive Growth.</p> <p>Audience: Researchers, policy, practitioners, communities.</p>	Complete	<p>The project has involved involved an in-person engagement workshop (3rd March 2020), two blogs and following the early identification of priorities, a framework for the analysis of inclusive growth in the diverse geographical context of the Highlands and Islands was developed. This formed the basis for later discussions around data sources and key indicators. Further data analysis has created new knowledge about the characteristics of inclusive growth within the Highlands and Islands and work in this area will continue. A case study will follow in due course to outline the team’s research and any further developments.</p>
Virtual Crop Tour	<p>Arable Scotland brings together major stakeholders to demonstrate and discuss key industry issues. In 2020 the event focused on ‘alternative crops’, emphasising their potential for innovative and sustainable farming. Due to COVID-19, summer events were cancelled, and virtual events designed to replace them. This project aimed to deliver a fully immersive Virtual Crop Tour, where participants can actively explore field trials, see crops develop over time, access textual information and interact with experts.</p> <p>Blog is available here.</p> <p>Audience: Farmers, growers, industry.</p>	Complete	<p>Virtualising crop tours at Arable Scotland gave increased (and safe) access to existing research materials in a novel and engaging manner. The use of virtual technology allowed participants to engage with a fully immersive experience providing the opportunity to interact with current research ideas and concepts. At the event there was a live Guided Digital Crop Tour with 70 attendees and the lasting resource has already had 2300+ views and has “<i>engaged with significantly more participants virtually</i>”.</p>

Project	Focus and audience	Status	Outcome
Cross SEFARI Integration Capacity	<p>We are continually working to add material to, improve the user experience of, and increase access to the Strategic Programme Research on, our website (www.sefari.scot) and this project funded capacity to aid this activity. In particular, activities focused on the development and maintenance of the directory or expertise and our project summaries (aims and objectives) across the breadth of the Strategic Research Programme.</p> <p>Audience: Website users.</p>	Initial period complete but will be an ongoing need	Support via this project was and will continue to be invaluable. The Directory of Expertise and Aims and Objectives are most beneficial when kept up to date, ensuring updates are collated and put into place is vital. Considering the size of the Strategic Research Programme, this task should not be underestimated, and capacity funded through this project enabled the continuation, monitoring and updating of key entries in an accurate, through and frequent manner.