Update on FSS's Science Programme: Key Outputs and Future Priorities

1 Purpose of the paper

1.1 This paper is for **discussion**.

1.2 The Board is asked to:

- **Note** progress with the development of our science functions and research programme since the publication of FSS's strategy for 2021-26;
- **Consider** how science outputs have been used to underpin our strategic goals during this period, and **provide views** on our proposed priorities for science and evidence in 2023/24;
- **Agree** that FSS's Chief Scientific Advisor (CSA) should undertake a detailed review of our science and evidence needs, taking account of FSS's recent prioritisation exercise, and present his findings to the Board in March 2023.

2 Strategic aims

2.1 The science programme described in this paper underpins all five of the organisation's strategic outcomes for 2021-26 and comprises activities under Goal 3: A research and data science capability which enables us to detect risks, monitor public health trends and consumer behaviours, and translate evidence into action.

3 Background

3.1 FSS's Science, Evidence and Information (SEI) Strategy was approved by the FSS Board for publication in April 2017 and has recently been updated in line with our new organisational strategy and corporate plan. The SEI strategy and governance statement support the FSS statement of performance of functions by describing how our staff ensure effective use of science to underpin FSS's statutory responsibilities, risk analysis functions and strategic priorities. FSS appointed its first Chief Scientific Advisor (CSA) in April 2016, to act as an ambassador for science both within FSA and externally through links with CSAs in other parts of government, and engagement with stakeholders, the media and the wider scientific community. Our CSA also works closely with the head of science to strengthen FSS's science profile, and provides high level assurance and governance over the use of SEI across all areas of the business; offering independent challenge and advice to our officials, Executive Leadership Team (ELT) and the Board.

3.2 This is the first review of FSS's science programme since the publication of our strategy for 2021-26, and the appointment, in December 2020, of our second CSA, Professor David Gally. During the first two years of Professor Gally's tenure, our science functions have been subject to significant structural change, to support the risk analysis functions that FSS acquired when the UK left the EU, and to align with the priorities set out in our latest strategy.

This paper aims to capture some of the key milestones and achievements from our science programme over the past two years, and share our proposals for future work to improve the prioritisation of our evidence needs and the impact of our research and data.

4 Discussion

How science is delivered in FSS

4.1 Science expertise is embedded across FSS, with qualified food scientists, veterinarians and environmental health professionals working across all of our key operational functions. In terms of the delivery of our SEI programme, this work is brigaded into four dedicated teams of staff with qualifications and research experience in natural and public health science disciplines. The head of science provides oversight for scientific advice and the commissioning of research, surveillance and monitoring to support our evidence base on food safety and standards and trends in foodborne illness. Science needs relating to our diet and nutrition remit are managed separately, but there is strong collaboration between the teams, which enables the sharing of data and support on science governance and the commissioning of research. The roles and remits of our science teams are described below:

Risk Assessment (RA; 7 staff) – Leads on the provision of microbiological, allergen and chemical risk assessment and scientific advice needed to inform the investigation and management of food safety incidents in Scotland and FSS's role in the UK risk analysis process. This team commissions food surveys and research to generate evidence for risk assessment and technical risk management including guidance for enforcement and industry. Our risk assessors attend meetings of UK Scientific Advisory Committees including the Advisory Committee on Microbiological Safety of Food (ACMSF), Committee on Toxicity (CoT), and the Advisory Committee on Novel Foods and Processes (ACNFP), as well as parent committee subgroups of interest and the Joint Expert Groups (JEGs) which provide advice on the authorisation of regulated products. The head of RA is also a member of the UK Cross-Government Risk Assessor Network (CRAN).

Food Protection Science and Surveillance (FPSS; 8 staff) – Leads on the commissioning of research and analysis of evidence used to support interventions for reducing foodborne illness. This includes working with Public Health Scotland (PHS) to understand trends in reporting of gastrointestinal disease and how insights from epidemiological surveillance can be used to identify potential sources. FPSS is also responsible for FSS's food surveillance and monitoring strategies and provides oversight of laboratory capacity and capability for official controls in Scotland. The team engages with FSA, other parts of UK government, and international partners on foodborne illness and surveillance and provides food safety advice to support Scottish Government (SG) on cross cutting strategies relating to climate change, antimicrobial resistance (AMR) and food waste reduction.

Analytical Functions (AF; 4 staff) – Provides data analytics and social science expertise to support all of FSS's strategic priorities and business needs. This includes consumer research, the development of trackers and questionnaires, and the analysis and presentation of datasets collected by FSS and external data sources which are relevant to our work. This team also provides advice on evidence relating to socioeconomic factors that may be relevant to the recommendations FSS makes through risk analysis and the development of policy on food safety and nutrition.

Nutrition Science and Policy (NSP; 9 staff) – Leads on the provision of expert public health nutrition advice. This includes commissioning research, analysis and reporting of data such as consumer retail and out of home purchasing alongside dietary intake data to monitor dietary health trends in Scotland. NSP supports SG and PHS in the development, monitoring and implementation of dietary health policy in Scotland. The team also attends meetings of the UK Scientific Advisory Committee on Nutrition (SACN) on behalf of SG.

4.2 Professional development is a priority for our science staff, with specific work objectives allocated to the maintenance of skills and up to date awareness of the relevant fields through regular reviews of the scientific literature and attendance at conferences and workshops. Seven members of the nutrition team are registered with the Association for Nutrition as public health nutritionists, with the other two working towards full registration. Our head of science is a Fellow of the Institute of Food Science and Technology (IFST), and a further eleven of our food safety scientists are members, five of whom have been awarded chartered status under the IFST scheme. Our analysts are also registered with the UK Government's Social Research Profession or Statistical Service.

4.3 The provision of scientific advice, data analysis and risk assessment continues to underpin the majority of our business activities including policy development, enforcement delivery, communications and marketing and incident response. Over the past two years the growth in our science teams has enabled us to develop new approaches for undertaking our risk assessment, dietary monitoring and surveillance functions whilst continuing to build our research base through the commissioning of our own projects and strengthening partnerships with other funders. We have also placed a renewed focus on improving the use of our data to monitor FSS outputs and performance. This work has enabled us to build on the information published in our annual report and develop a set of metrics for assessing our progress with activities outlined in our Corporate Plan for 2021-24.

4.4 Important developments in our SEI strategy since the previous Board update are described below under five headings: ***Key Outputs from our Science and Evidence Programme (2021-22)***, ***A New Framework for Commissioning Evidence***, ***Research Collaboration***, ***Engagement and Outreach***, and ***Future Direction and Priorities for SEI***.

Key Outputs from our Science and Evidence Programme (2021-22)

4.5 **Forming a dedicated risk assessment team** has been one of the most significant developments in our science programme over the past two years. This has enabled us to ensure a clear separation between our risk assessment and risk management functions and provide the scientific oversight needed to support FSS input into the UK risk analysis process. This team works closely with FSA risk assessors to help risk managers in both organisations with the framing of problem formulation statements, which are required to define the scope of a risk assessment, and determine the data and evidence that is needed to complete it. It also contributes to the drafting of UK risk assessments, and, where appropriate, leads on the writing of assessments and papers to support our independent scientific advisory committees and joint expert groups in formulating the advice used to underpin risk management decision making. To date, the FSS team has led on risk assessments that have been used to inform testing strategies for marine gastropods, and the development of advice for vulnerable consumers on Listeria risks associated with smoked fish. It has also worked with the FSA to produce rapid risk assessments on the potential

allergy risks associated with the substitution of sunflower oil following shortages caused by the war in Ukraine and an assessment of risks associated with Listeria in blue cheese. In addition, FSS risk assessors work as part of the team responsible for delivering the GB regulated products application service, to review the scientific dossiers submitted by businesses seeking authorisation for placing regulated products on the market. They also provide support to the FSA team in areas where they are recognised to have specialist knowledge, such as genetic modification, Shiga toxin-producing *E. coli* (STEC) and shellfish safety.

4.6 **Understanding the impacts of foodborne illness** continues to be a strategic priority for FSS, and a key focus for our science and evidence programme. Campylobacter is still the most common bacterial cause of infectious intestinal disease (IID), and we have made good progress in identifying the main risk factors for consumers in Scotland. Research we conducted with PHS assessed demographic trends in campylobacter infections in Scotland by linking data on reported cases with NHS records on hospitalisations and deaths. By bringing the findings of this work together with evidence from consumer surveys and earlier research on factors affecting campylobacter disease rates, we identified the over 65s as a target group for consumer focussed interventions aimed at reducing the burden of disease. This work has led to the design a new targeted communications approach aimed at promoting uptake of our food safety messaging by older people in Scotland. Our 'Staying Safe from Campylobacter' initiative has now been rolled out to two retailers and three assisted living providers across Scotland, and will be evaluated in the new year to inform future messaging on the risks associated with this pathogen. In parallel with our work to support consumers in managing Campylobacter risks, we are continuing to collaborate with FSA to monitor levels in UK retail poultry. Our current survey is due to report at the start of next year, and will provide an up to date picture of the levels of Campylobacter (in addition to other pathogens and the prevalence of AMR), enabling us to assess the need for renewed focus on interventions throughout the production chain. In addition to our work on Campylobacter, we have initiated new research aimed at identifying the main sources of Salmonella, which is Scotland's second highest cause of bacterial IID. By commissioning the Scottish Salmonella Reference Laboratory[1] to undertake Whole Genome Sequencing (WGS) of isolates from food, environmental and veterinary samples, it will be possible to undertake comparisons with strains from human cases; providing new insights into the attribution of Salmonella infection in Scotland. Another important development in our foodborne illness research programme has been the commissioning, by the FSA, of the Third Study of Infectious Intestinal Disease in the UK (IID3). FSS is co-funding this 5 year project to support the collection of data from Scotland which will enable us to assess, over time, changes in the burden of foodborne illness caused by different pathogens, and support the targeting of future public health interventions.

4.7 **Strengthening our evidence base on hazards and contamination risks** has played an important role in the development of guidance for improving food safety management. We have commissioned a range of projects aimed at characterising microbiological and chemical hazards in food production and the measures needed to manage the risks to consumers.

[1] Full title is the Scottish Salmonella, Shigella and Clostridium difficile reference laboratory (SSSCDRL)

With regard to microbiological safety, on-going promotion of our evidence review of Shigatoxin producing *E. coli* (STEC) and other pathogen risks in unpasteurised cheese, and accompanying guidance on sampling, has helped enforcement authorities to engage with this sector on improvements to food safety management. We have further strengthened our evidence base on STEC risks through subsequent research conducted with PHS and the Scottish *E. coli* O157/ STEC Reference Laboratory (SERL), which employed WGS to characterise the genetic profile of STEC infection in Scotland. This has greatly improved our understanding of the severity of illness caused by different STEC strains, enabling us to more effectively target our risk management approach when these pathogens are detected in food. Over the past two years, we have also published research projects on the prevalence of STEC and other pathogens in minced beef and the wild venison production chain which have helped us to assess contamination risks in these foods, and informed the development of industry guidance. In 2021, we also re-launched our two on-line food safety management tools for smoked fish and fresh produce, which provide the scientific evidence required by businesses producing these ready to eat foods to undertake their own risk assessments for the control of microbiological hazards. On chemical safety we have recently published the findings of a preliminary study on contaminant and mycotoxin risks in oat based products and plant based dairy alternative drinks, which will help to inform recommendations on safety limits that align with patterns of consumption. We have also commissioned a new study to assess the incidence of a variety of chemical contaminants in wild-caught fish and fishery products landed in Scotland, to support both industry and enforcement authorities in developing sampling programmes aimed at verifying the safety of products intended for both domestic and export markets.

4.8 **Improving the data we collect through food surveillance** has been another focus for our science programme over the past two years. Surveys and sampling programmes have always played a key role in our work, but they have become even more important in ensuring our evidence base is able to keep pace with an increasingly dynamic food system and regulatory landscape. Following the UK's departure from the EU, changes to our risk analysis responsibilities, and the need to understand the impacts of emerging risks to our food chain arising from new technologies and import arrangements, have required us to adapt and refine our approaches for generating this data and intelligence. Earlier this year, the board approved our proposal for a new food surveillance sampling strategy for Scotland. Through this strategy, we are intending to augment our existing food sampling programmes, which include surveys aimed at measuring the prevalence of contaminants in different foods, and targeted, intelligence led activities designed with Local Authorities to assess the potential impacts of emerging risks identified through our horizon scanning work. By incorporating a new 'shopping basket' approach, we plan to collect data relating to a broader range of chemical and microbiological parameters and nutritional properties across food products which are most commonly consumed in Scotland. We are currently funding a project to design a sampling and testing framework for delivering our new programme, which we hope to take forward in 2023/24. Enhancing food sampling at national level will not only strengthen our surveillance and risk analysis capabilities, but will add value to our evidence base through the generation of data and samples that can be used to support other parts of our science programme or shared with others to support wider research aims. By providing an additional funding stream for Scotland's Public Analyst (PA) laboratories, this programme will also support wider efforts to safeguard Scotland's capacity and capability for the analysis and examination of food and animal feed.

4.9 **Providing the authoritative source of evidence on Scotland's diet** is the key driver for our science and evidence programme on public health nutrition. We continue to be the only national organisation in Scotland to monitor and report on progress towards the Scottish dietary goals, and over the past two years, we have made significant improvements in how this data is collected and used. Integrating the digital tool Intake24 to collect dietary intakes within the Scottish Health survey has been an important milestone in the development of our dietary monitoring strategy, enabling us to undertake more detailed analyses of trends that will support improved targeting of policy interventions. To complement this data set, we have also strengthened our use of consumer purchasing data collected by Kantar. During 2021 and 2022 we used this data to update our estimates of food and drink nutrient intakes in Scotland, and assess the impact of the COVID pandemic on the Out of Home (OOH) food environment, eating patterns and behaviours inside the home, and retail purchase and price promotion. Earlier this year we collated the findings of these analyses in a situation report to support policy makers, educators and stakeholders in understanding how changes driven by the pandemic affected Scotland's diet. In addition, Kantar data has provided a useful source of evidence in emerging areas of interest such as the consumption of meat alternatives and non-dairy alternatives, which will also support FSS in the development of future policy on food safety and novel foods.

4.10 **Improving the use of our data and evidence to drive improvements to diet and the food environment** is another important aim of our public health nutrition strategy, and our work on out of home calorie labelling has demonstrated the potential of our research programme to influence policy in this area. Over the past year we have published reports on the provision of calorie and nutrition information by branded out of home businesses, research on the impacts of out of home calorie labelling on those experiencing socioeconomic disadvantage, and a rapid evidence review of the effectiveness of calorie labelling in the out of home sector, all of which have provided robust evidence to support this policy intervention as a means of reducing calorie intakes in Scotland. We have also used our data to support SG policy on restricting High Fat,, Salt and Sugar (HFSS) promotions in the retail environment, which will be included in the forthcoming Public Health Bill. The data and evidence we have collected through research and monitoring has further been used to develop resources aimed at improving the public's knowledge on nutrition and health. This includes the updating of our evidence based healthy eating tutorial and the creation of our new on-line tool for consumers; Eat Well, Your Way, which enables the public to access scientifically robust, practical guidance on how to achieve a healthier diet in the context of their own lives. We also provide support for the food industry to improve their offering for consumers through a series of sector specific healthy catering guides. In light of increasing concerns over the wider impacts of dietary health policy we have contributed evidence from our research and monitoring programmes to a range of SG reviews including inquiries into the health and well-being of children and young people and health inequalities, and consultations on plans for ending the need for food banks, and Scotland's national planning strategy up to 2045.

4.11 Developing a new social science capability has enabled us to strengthen the evidence base we have been generating since 2015 through our biannual Food in Scotland Consumer Tracking Surveys. Our social science team explores the findings from these surveys to understand attitudes, knowledge and reported behaviours in more detail, and also helps us to generate new insights on specific issues identified through risk analysis, incidents and policy development. This includes a project to investigate food handling practices that may have contributed to an increase in Salmonella infection in 2020/21, and research to be published

next year which is examining food behaviours in the student population. In addition we have also published new insights into parental views on diet and food related behaviours which will support our consumer messaging aimed at improving dietary health. Through the commissioning of our own targeted research and projects co-funded with the FSA, our social researchers have provided evidence and advice to support risk analysis and policy on emerging food issues such as CBD, precision breeding and the use of recycled plastics in food packaging. Earlier this year, we worked with the FSA on the commissioning of new research aimed at providing a detailed snapshot of the current interests, needs, and concerns of UK consumers relating to food, which was used to inform the FSA/FSS Joint annual report: 'Our Food 2021 – An annual review of food standards across the UK'. We published findings from this study that were relevant to Scotland, which have provided us with a baseline for monitoring trends and identifying issues which would benefit from more in-depth consumer research.

4.12 **Enhancing our data science capability** is a key commitment in our organisational strategy for 2021-26, and despite our limited resources, we have made significant progress in developing the tools, competencies and ways of working that will enable us to optimise the wealth of data that is collected across FSS and gain access to external data sources which support the delivery of our corporate goals. Since setting up our new Analytical Functions team in 2020, we have demonstrated the value of building in-house data science expertise through the development of new reporting dashboards which allow us to analyse and present the outputs of our national food surveillance programmes and generate metrics for monitoring trends in our corporate and operational data sets. Data science capability has also become increasingly important in the development of our systems for collecting and analysing data sets relating to food business compliance, which are critical to the success of our Regulatory Strategy and programmes of work aimed at modernising the delivery of food law enforcement. Data and digitalisation is still a developing area in FSS for which we set out our ambitions at the October 2022 Board meeting, and it is important that we are able to maintain and strengthen these capabilities in order to achieve our aim to deliver all of our work in a more data driven way.

A New Framework for Commissioning Evidence: FSS's Food and Health Research Programme

4.13 FSS has had a dedicated research programme since the organisation was established in 2015, through which we have commissioned an extensive programme of work to support our policy development, communications and enforcement delivery functions. Our scientists review evidence needs on an on-going basis through regular engagement with relevant FSS business leads, stakeholders (including other parts of government and the wider scientific community), and reviews of published literature. New research is commissioned only where gaps are identified, and there is a clear policy driver. All of our research reports are published on the FSS website, and catalogued in a summary of the outputs and impact of all of the projects we have commissioned since 2015.

4.14 The introduction of FSS's strategy for 2021-26 provided an opportunity to review our evidence needs and research priorities to ensure alignment with our new strategic outcomes and goals. This work led to the development of a new Food and Health Research Programme (FHRP), which has provided us with a structured mechanism for monitoring and reporting on our research activities, and a means of promoting our interests more widely to

identify where we may be able to access existing data and evidence and opportunities for collaboration.

4.15 The FHRP comprises six research themes:

- Understanding the Scottish diet
- Supporting Consumers to have healthier diets
- Understanding and mitigating risks to the food chain
- Foodborne illness and allergy
- Evidence based regulation
- Adapting to change in our food system

4.16 The current budget for our FHRP is just over £1.3 million, which is funding a total of 25 research, monitoring and surveillance projects in addition to a number of activities which support FSS's competent authority role and wider science profile (titled Maintaining Capability[2]). Figure 1 breaks down current spend against each of the FHRP themes[3] and this group of additional activities. A more detailed description of the six research themes and how they align with our strategic outcomes is also provided in Annex 1.

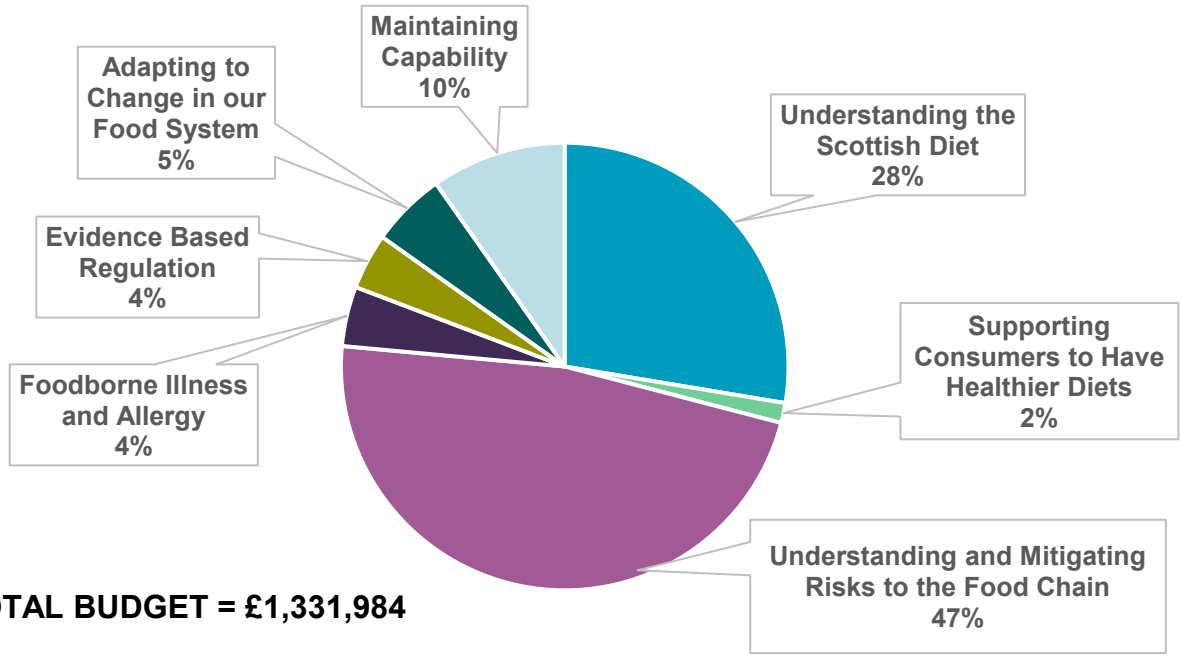

Figure 1. A breakdown of the current FHRP budget

4.17 The thematic approach we have developed through the FHRP has also allowed us to map our own research projects across to work that is being taken forward through SG's Strategic Research Programme (see para 4.18) and FSA's Areas of Research Interest (ARIs; Areas of research interest | Food Standards Agency). This enables us to demonstrate how jointly

[2] This currently covers costs of our contributions to the funding of UK National Reference Laboratories (NRLs; a requirement of Retained EU Regulation on Official Controls 2017/625) and national activities relating to scientific methods for food authenticity and standards.
[3] Figures from 31 October 2022

funded research programmes read across to cross government priorities and identify areas of duplication and complementarity.

Research Collaboration

4.18 By investing in collaborative working, our science teams ensure we maintain an up to date awareness of the science that is relevant to our work, avoid duplication, facilitate data sharing, and achieve best value for money. Our most important science partnerships are with the FSA, SG and PHS, with whom we regularly co-design and jointly fund evidence gathering activities to support shared interests. We have continued to strengthen these relationships through our own research programme, which currently includes seven projects that are co-funded with FSA, and one with PHS. In addition, we are involved in a number of other collaborative research activities which are described below.

4.19 FSS has always provided a level of support for **SG's Strategic Research Programme (SRP) on Environment, natural resources and agriculture** which is managed by the Rural and Environment Science and Analytical Services Division (RESAS). The SRP is a large scale, multidisciplinary programme with a budget of around £50 million a year. The primary purpose of the SRP is to provide science and evidence to support SG and the majority of the programme is delivered through its Environment, Food and Agriculture Research Institutions (SEFARI). For the 2022-27 SRP we were asked to devise the research requirements relating to diet and food safety for one of the themes of the programme titled *Sustainable Food System and Supply*. This has enabled us to leverage the expertise that exists within the SEFARI institutions to support our evidence base across a wide range of FSS priorities including the transmission of foodborne pathogens and AMR, the development of methods for assessing provenance and detecting contaminants in food, reformulation, and interventions for promoting healthy, sustainable diets. FSS science teams are engaging with SRP research groups on an on-going basis to review outputs and steer activities to ensure complementarity with our FHRP. We have further opportunities to access scientific expertise from the institutions via the RESAS Underpinning Capacity programme which includes a Support to Policy 'call-down' fund for small research projects in areas of joint interest. SEFARI also offers a Fellowship scheme, which provides an additional way for us to co-fund targeted research projects up to six months. We are currently exploring these routes for commissioning a number of evidence reviews to support our programmes of work on nutrition and foodborne pathogens

4.20 Another important development for FSS's research profile has been our involvement in **PATHSAFE (Pathogen Surveillance in Agriculture, Food and the Environment)**; a 3 year cross government programme led by the FSA and DEFRA which started in 2021, with £19.2 million from the UK Treasury's Shared Outcomes fund. PATHSAFE aims to develop a pilot national surveillance network, using the latest DNA-sequencing technology and environmental sampling to improve the detection and tracking of foodborne and antimicrobial resistant pathogens through the agri-food system. One of the intended outputs is a new database that will permit the analysis, storage and sharing of pathogen sequence and source data, collected from multiple locations across the UK by government and public organisations. FSS has received funding to lead a Scottish pilot project that will contribute to PATHSAFE, for which we are utilising samples and data from existing surveillance and monitoring programmes to examine the genetic relatedness between *E. coli* strains isolated from different sources (farmed and wild ruminant animals, poultry, pigs, shellfish, wastewater

and retail food products), with those isolated from clinical samples, to provide insights into potential transmission routes for human infection. To deliver this work we are collaborating with a range of partners including SEPA, the PA laboratories, CEFAS, SRUC and the Moredun institute, and have funded a bioinformatician post who is seconded through the University of Edinburgh to support our team in managing the project and lead on the analysis and organisation of sequencing data for the PATHSAFE database.

4.21 Over the past year we have also strengthened links with research programmes being led by other UK funding bodies, which has enabled us to steer outputs and gain access to a wider evidence base relevant to our work. We meet regularly with UK Research and Innovation (UKRI) and have provided support for a number of proposals submitted through their Transforming UK Food Systems Strategic Priorities Fund (SPF) Programme[4]. We are also engaging with their Food Safety Network[5], and Diet and Health Open Innovation Research Club[6]; new initiatives aimed at promoting collaborative research between scientists and the industry to address public health challenges relating to food. More recently, we have been supporting bids for a new Wellcome funding research call titled 'Advancing Climate Mitigation Policy Solutions with Health Co-benefits in G7 Countries' in areas that would benefit the food environment in Scotland.

4.22 Working with Universities and further education providers can be a useful means of accessing additional resource for project work and also helps to promote awareness of science careers within FSS. Our science teams support Universities by offering placements, designing projects, and funding studentships in areas which align with our FHRP themes. For example our NSP team has supported placements for undergraduates from the University of Glasgow and Robert Gordon University which provide students with the opportunity to apply their nutritional analysis skills in a policy context. FPSS is currently funding two PhD studentships: one with the University of Cranfield which is developing an early warning tool for detecting food chain disruption, and another with University of West of Scotland to assess the effectiveness of allergen controls in small food businesses. This year, our teams developed projects for students studying for the University of Aberdeen's Masters course in Applied Health Sciences. We have recognised that there is scope for us to build on this programme, through wider engagement with the academic research community on the evidence needs we have identified through our FHRP.

Engagement and Outreach

4.23 Our teams have developed impactful networks with the wider science community both across the UK and internationally, which enable us to share experience, data and research outputs in areas of common interest. We engage regularly with counterparts in the Food Safety Authority in Ireland, The Ministry for Primary Industries in New Zealand and Health Canada to ensure we remain sighted on global advancements relating to public health nutrition and foodborne illness reduction. Attendance at conferences and workshops provide further opportunities for engaging with the wider science community and promoting our work. Over the past two years, our scientists have been active participants in SG's annual congress for

[4] A partnership between the Global Food Security Programme, BBSRC, ESRC, MRC, NERC, Defra, DHSC, PHE, Innovate UK and FSA
[5] Funded by the BBSRC and FSA
[6] Funded by BBSRC

Science and Engineering, and have presented at eighteen scientific conferences, including a number of international events.

4.24 Our science staff are also involved in a number of outreach activities aimed at promoting awareness of SEI programmes and science careers in FSS. In addition to attendance at events including the Edinburgh Science Festival and the Royal Highland Show, our teams regularly give lectures and support education events in Universities and schools across Scotland. A number of our scientists are ambassadors for the STEM learning programme, which has provided opportunities to engage with students at all levels to promote the work of FSS through careers talks, interviews and competitions.

4.25 The CSA has continued to play an important role in promoting FSS's interests in strategic science networks. At UK level, he meets regularly with the FSA's Chief Scientific Advisor Professor Robin May to share experience and information on strategic priorities for science. Within Scotland, he represents FSS across Scottish Government (SG) in the Environment, Natural Resources and Agriculture (ENRA) network which includes the CSAs from environment, marine, the Chief Veterinary Officer and Chief Plant Health Officer to ensure coordination of advice and evidence, particularly across areas of mutual interest. Alongside the head of science, Professor Gally takes part in two groups led by Scottish Government's CSA Professor Julie Fitzpatrick; the Science Leadership network and Scotland's National Laboratory Network Advisory Group. He has also recently joined a new Working group of the Scottish Science Advisory Council on 'Scotland's food security – the contribution of local production'.

Future Direction and Priorities for SEI

4.26 Our achievements over the past two years have set a strong foundation for developing our SEI programme as the FSS strategy evolves. As we move into the second half of our Corporate Plan delivery period, it is an appropriate point for us to take stock and set a clear direction which ensures SEI continues to be used effectively across all of our organisational objectives. Figure 2 summarises our proposed approach to the use of SEI in 2023/24, which will be applied to deliver the key areas of work that have been identified in FSS's recent prioritisation exercise.

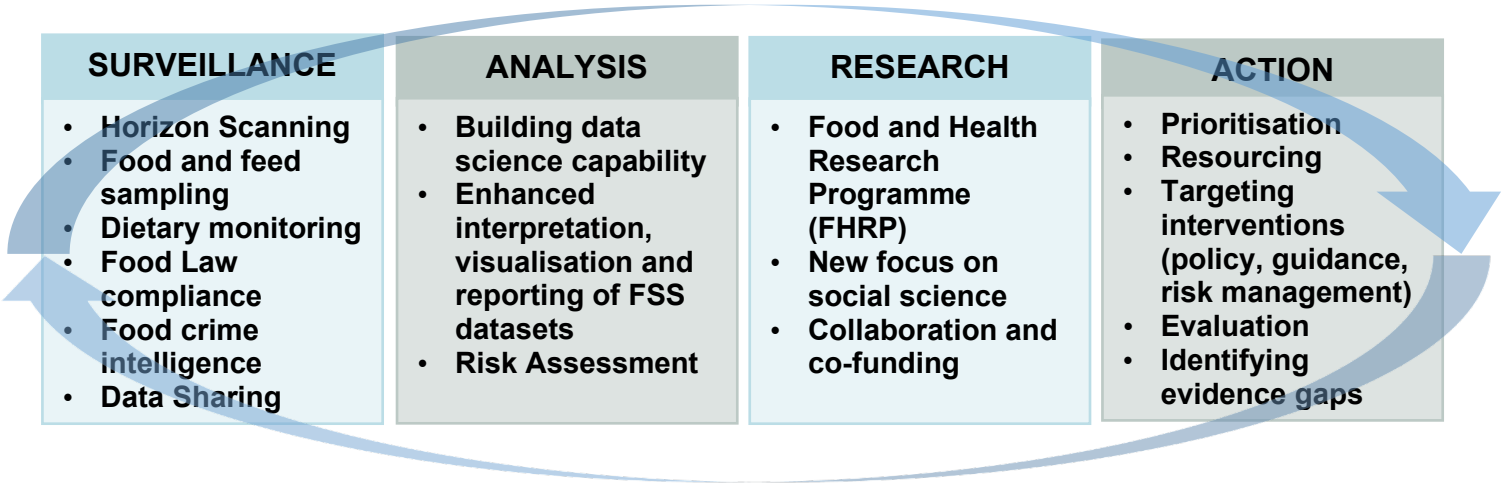

Figure 2. Our proposed approach to SEI in the delivery of FSS priorities for 2023-24.

4.27 Resource pressures resulting from the spending review will present challenges, particularly in terms of funding for our research programme. This will require us to focus efforts on SEI activities which are impactful and enable us to achieve best value from our existing resources and expertise. We have therefore identified the activities below as high level priorities for our SEI programme in 2023/24, which will drive our business planning process, and inform the development of new projects that we will take forward under our FHRP.

a) **Investing in skills which strengthen in-house capability:** through the provision of learning and development which promotes continuous improvement in core science and research expertise needed to deliver high quality evidence reviews, dietary analysis, risk assessment and technical risk management. We will also provide more opportunities for our scientists to develop their communication and engagement skills; enabling them to enhance their profile and build impactful partnerships with the wider science community.

b) **Developing our evidence base through surveillance and monitoring:** building on the good progress we have already made in improving our systems for horizon scanning and the collection of data on food chain risks and dietary intakes. The delivery of enhanced surveillance sampling will provide key evidence to underpin risk assessment and our programmes of work on food safety and nutrition, as well as resources to support the maintenance of laboratory capacity and capability, and materials and data which can be shared for wider research purposes.

c) **Understanding how we can best serve consumers in Scotland:** exploring research methods which enable us to enhance the quality of our data and insights on the knowledge, attitudes and behaviours of people living in Scotland. Societal and geopolitical pressures have made it increasingly important for us to keep pace with the factors that are affecting the public's relationships with food, and the impact on health of food purchase and consumption to ensure our evidence base is properly targeted to the needs of those we are here to protect.

d) **Optimising and sharing our data and evidence:** through improved processes for prioritising our evidence needs and identifying the most efficient and effective means of addressing them-either through commissioned research or our own data and analytics capabilities-as well as formalising data sharing partnerships with key stakeholders, and making our data available to the scientific community to support wider research aims.

e) **Increasing our science profile and promoting collaboration:** by raising awareness of our science through the design of a new SEI page on the FSS website and strengthening our engagement with scientists and other funders to promote our FHRP priorities and identify areas for collaboration and joint funding which will enable us to maximise the impact of our research budget.

4.28 To support planning and prioritisation of our SEI programme in future years, we also propose that the CSA undertakes a review of our specific evidence needs, based on the outputs of the prioritisation exercise that has been undertaken across the organisation, with recommendations on how these can be addressed in the most effective and efficient manner.

5 Identification of risks and issues

5.1 Our inability to allocate the required level of resourcing to our SEI programme due to budget pressures and the outcome of FSS's prioritisation exercise presents the most significant risk to our ability to deliver this function in line with commitments made in FSS's strategy for 2021-26. The proposal made in this paper for the CSA to undertake a full review of our SEI needs and processes for addressing evidence gaps will help us to align our future programme to new priorities and deliver our programme within the confines of our budget. On-going efforts to promote collaboration and partnership working on research, coupled with improved use and sharing of data will also help us to optimise value for money in this area.

6 Equality Impact Assessment and Fairer Scotland Duty

6.1 Equality Impact Assessment (EQIA) and Fairer Scotland Duty requirements do not apply to the information presented in this paper, although the Board will wish to be aware that both are undertaken routinely during the development of research requirements and the commissioning of individual projects.

7 Conclusion/Recommendations

7.1 The Board is asked to:

- **Note** progress with the development of our science functions and research programme since the publication of FSS's strategy for 2021-26;
- **Consider** how science outputs have been used to underpin our strategic goals during this period, and **provide views** on our proposed priorities for science and evidence in 2023/24;
- **Agree** that FSS's Chief Scientific Advisor (CSA) should undertake a detailed review of our science and evidence needs, taking account of FSS's recent prioritisation exercise, and present his findings to the Board in March 2023.

Please direct queries to:

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Annex 1 – The six themes of FSS's Food and Health Research Programme (FHRP)

THEME	EVIDENCE NEEDS	STRATEGIC OUTCOMES
Understanding the Scottish Diet	Monitoring and analysis of food and drink purchasing. Measuring and evaluating dietary intakes. Nutritional analysis of food. Understanding consumer attitudes and behaviours relating to diet. Understanding the impacts of inequalities on diet and health.	Consumers have Healthier Diets Consumers are empowered to make positive choices about food FSS is trusted and influential
Supporting consumers to have healthier diets	Development and piloting of approaches for promoting behaviour change towards healthier diets. Lessons learned from other countries which have been successful in improving the national diet. Identifying the best ways of evaluating the impacts of new policies and initiatives aimed at improving the diet.	Consumers have Healthier Diets Consumers are empowered to make positive choices about food FSS is trusted and influential
Understanding and Mitigating Risks to the Food Chain	Measuring the prevalence of pathogens and contaminants in food. Development of new approaches for risk assessment. Methods which enable the rapid identification of food safety risks. Understanding how environmental contaminants impact on the food chain.	Food is Safe and Authentic FSS is trusted and influential
Foodborne Illness and Allergy	Identifying the key sources and transmission routes for pathogens in food and the environment. Improving our evidence base on AMR in the food chain. Understanding the socioeconomic trends and burden of foodborne disease. Understanding the impacts of food hypersensitivity and allergy. Understanding consumer perceptions of risk to target our advice and messaging.	Food is Safe and Authentic Consumers are empowered to make positive choices about food FSS is trusted and influential
Evidence Based Regulation	Development of data driven approaches to food regulation. Identifying the key motivators and barriers to food business compliance. Understanding the risks and impacts of food crime. Understanding the role of the consumer in driving compliance in the food industry. Scientific and digital solutions for ensuring provenance and traceability. Designing regulatory approaches which keep pace with emerging technologies and e-commerce.	Responsible Food Businesses are enabled to thrive Consumers are empowered to make positive choices about food FSS is trusted and influential
Adapting to Change in our Food System	Assessing how geopolitical factors and climate change impact on food attitudes and behaviours. Identifying the impacts of climate change on diet and food safety risks. Monitoring the views and concerns of consumers regarding novel foods and emerging technologies. Understanding how sustainable food systems can affect food safety and dietary health. Understanding how changes to the food system can influence food crime.	Food is Safe and Authentic Consumers Have Healthier Diets Responsible Food Businesses are enabled to thrive Consumers are empowered to make positive choices about food FSS is trusted and influential