Annex C – Call Off Agreement Form

MOU Between the FSA and UKHSA: CALL OFF AGREEMENT FORM		
This Form is to be used by the FSA when requesting that work be undertaken within the terms of the MOU. The Parties agree that each completed and approved Form will form part of and be interpreted in accordance with the terms and conditions of that MOU.		
Project Title: A survey of AMR E. coli and Listeria spp. on raw, prepacked, farmed salmon fillets on retail sale in the UK (Lot 2) - Microbiological testing, data analysis and reporting.	**FSA Reference:**	FS900350 - C210688
	Date:	18/12/2023
FSA – Project Representative: Wioleta Trzaska	**Tel:**	
	E-mail:	Wioleta.Trzaska@food.gov.uk
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Project Start Date	15/01/2024	
Project Completion Date	31/05/2025	

Project Summary

Lot 2: Microbiological testing, data analysis, reporting and archiving of recovered bacteria and their AMR profiles.

Applicants are invited to submit bids to carry out the testing (detection[1], enumeration and antimicrobial susceptibility testing) of the prepacked, raw, farmed salmon fillets sampled at retail in the UK for *E. coli* and *Listeria* spp., as specified in Table 1 below.

Testing will be informed by the study design but will be based on a total of 300 raw salmon collected over a period of 12 months between January 2024 to December 2024. Applicants must ensure good quality control throughout the sample arrival/logging and analysis and long-term storage of samples.

Full detail in the Specification/ Scope of Work section below.

Specification/ Scope of Work:

[1] Includes identification and speciation.

THE SPECIFICATION, INCLUDING PROJECT TIMETABLE AND EVALUATION OF TENDERS

GENERAL INTRODUCTION

The Food Standards Agency (FSA) is an independent Government department working across England, Wales, and Northern Ireland (NI) to protect public health and consumers' wider interest in food. We make sure food is safe and what it says it is.

The FSA is committed to openness, transparency and equality of treatment to all suppliers. As well as these principles, for science projects the final project report will be published on the FSA website (www.food.gov.uk). For science projects we will encourage contractors to publish their work in peer-reviewed scientific publications wherever possible. Also, in line with the Government's Transparency Agenda which aims to encourage more open access to data held by government, the FSA is developing a policy on the release of underpinning data from all its science- and evidence-gathering projects. Data should be made freely available in an accessible format, as fully and as promptly as possible. Consideration should be given to data management as new contracts are being negotiated. Resource implications for this should be considered. The mechanism for publishing underpinning data should allow the widest opportunity to enable its re-use. Where possible, underpinning data should be included in the final project report. Where data are included in the final report in pdf format, they should also be published separately in a format that can be used for further analysis. Large data sets can be provided separately in an annex to the report, and published, where possible, alongside the final report online. Where it is more appropriate to publish underpinning data in an existing database, archive, repository, or other community resource, or for data to be saved in a specialist proprietary format, information will be provided on how the data can be accessed. There will be some circumstances where release of data may need to be restricted or anonymized for reasons of commercial and/or personal sensitivities.

The objective of the microbiological food safety research themes is to provide robust information on the presence, growth, survival and elimination of pathogenic microorganisms throughout the food chain; the extent, distribution, causes, risks and cost of foodborne disease will also be considered where appropriate.

One of the main objectives within the FSA's Strategy for 2022-2027 is ensuring that 'food is safe'. We protect public health from risks which may arise through the consumption of food including risks caused by the way in which it is produced or supplied. A key component of our work is to monitor pathogenic microbiological hazards, including those that are antimicrobial resistant, in retail foods. Surveys provide a snapshot of the level of microbiological contamination and antimicrobial resistance (AMR) found in foods at retail. This is important in assessing potential consumer exposure to these hazards from the consumption of raw and/or undercooked foods but also through cross-contamination events when these foods are stored and handled unhygienically.

Data from the 2021 Veterinary Antimicrobial Resistance and Sales Surveillance (VARSS) report suggest that the usage of antibiotics in UK farmed salmon industry has significantly increased in recent years, equating to a 168% increase in 2022 in comparison to usage in 2017. This does raise an important question as to whether UK retail salmon is contaminated

with AMR bacteria and the potential risk this poses to consumers as salmon can be consumed raw or after processing. Given this, we are proposing to commission a survey that will gather data on AMR *E. coli* and *Listeria monocytogenes* (see Table 1) found in pre-packed raw, farmed salmon fillets at retail sale in the UK.

This survey is relevant to the 2019-2024 UK AMR National Action Plan (NAP) in terms of producing a new baseline of AMR bacteria found in salmon, whether this is a key reservoir or pathway by which consumers are being exposed to AMR bacteria (strengthening the evidence base around food and AMR).

A. THE SPECIFICATION

Background

Antimicrobial resistance (AMR) is the ability of microorganisms to withstand an antibiotic, to which it would normally be susceptible, therefore making the antimicrobials become ineffective. The emergence of AMR can limit the therapeutic options available to treat bacterial infections in both humans and animals. Unless action is taken now to tackle AMR, it has been estimated that there could be 10 million AMR-related deaths worldwide annually by 2050 costing up to US $100 trillion in cumulative lost economic outputs (Jim O'Neill, 2016).

Addressing the public health threat posed by AMR is a national strategic priority for the UK and led to the Government publishing both a 20-year vision of AMR and a 5-year (2019-2024) AMR National Action Plan (NAP). The NAP lays out how the UK is addressing the AMR challenge and includes a specific section on the importance of better food safety to limit the contamination and spread of AMR via the food chain. This section also emphasises the need to strengthen the evidence base for AMR and food safety through research and surveys, and promoting good hygiene practices across the food chain. The FSA is playing its part by continuing to address key evidence gaps on the role that food plays in AMR through the commissioning of research and surveys.

Surveillance is a key component of our AMR activities and in recent years we have funded several surveys to gather data on the types of resistant bacteria found in food on retail sale in the UK, predominately focussing on meats (such as chicken, turkey, beef, pork and lamb). Whilst continuing to monitor AMR bacteria in retail meats (particularly chicken) is important, there is a need to expand our AMR surveillance to cover other non-meat and ready-to-eat (RTE) food commodities. This will provide evidence on other potential reservoirs of AMR in the food chain and the pathways in which consumers can become exposed to AMR bacteria through the handing and consumption of raw or less than thoroughly cooked foods. Currently, there is limited data on AMR *E. coli* and *Listeria monocytogenes* in raw salmon and this survey will provide new baseline data, which will help determine research priorities for AMR going forward. In previous surveillance studies to monitor AMR bacteria in retail meats, AMR *E. coli* was one of the main microbes investigated, therefore we expanded our AMR surveillance to cover a gap in salmon fish. Additionally, a recent *Listeria* outbreak linked to smoked salmon has prompted a need to include *Listeria* in this survey in raw salmon.

The Veterinary Medicines Directorate (VMD) publishes on a yearly basis the VARSS report which presents data on veterinary antibiotic sales and usage data from the UK, and antibiotic data from England and Wales. The 2021 VARSS report (published in November 2022), shows a decreasing trend of the antibiotics used and/or administered across several food-producing animal sectors over recent years. However, for the salmon industry antibiotic usage has increased since 2017. It is reported that antibiotic usage in the salmon production sector was 8.9 tonnes in 2021 representing 43.1 mg/kg which is an increase of 13.8 mg/kg from the previous year (2020) and overall, 168% increase since 2017. The use of highest priority critically important antibiotics (HA-CIAs) in salmon decreased by 2.1mg/kg since 2020 and overall, 68% decrease in HA-CIAs since 2017. Oxytetracycline was reported as the most used antibiotic in the salmon industry accounting for 86% of total antibiotic use in 2021. Salmon Scotland states within the 2021 VARSS report that this increase relates to use during the marine phase of production, with a decrease recorded in freshwater, and provided reassurance within the report, that antibiotics are only used in response to the clinical presentation of bacterial infection, not as a prophylactic treatment. Despite high figures, antibiotic treatment is still infrequent in the salmon farming sector, with use in 8.5% of freshwater farms and 4.9% of marine farms in 2021, meaning that those fish which are treated probably exceed the 50 mg/kg maximum treatment concentration recommended in the O'Neill Report ("Review on Antimicrobial Resistance, 2016").

The increased usage of antibiotics in salmon production does raise an important question as to whether raw, prepacked, farmed salmon fillets on retail sale in the UK is contaminated with AMR bacteria and the risk this poses to consumers, as these fish products can be consumed lightly cooked or raw in certain foods such as sushi, sashimi and tartare. In 2016, the FSA published the findings of a systematic review of AMR bacteria in a range of UK retail foods which included seafood. This review concluded that there was a lack of data on AMR bacteria found in fish and seafood on retail sale in the UK. Whilst there is some data on AMR found in raw salmon outside of the UK (Ben Mhenni et al., 2023; Higuera-Llantén et al., 2018; Ojasanya et al., 2022), data on AMR in UK retail salmon and other fish remains limited. The need for data on AMR in fish was also highlighted as a survey priority at FSA's AMR Research and Evidence Programme Review held in March 2023 (unpublished data). Therefore, the FSA wishes to commission a survey of AMR *E. coli* and *Listeria* spp. in raw, prepacked, farmed salmon fillets on retail sale within the UK. Given that our previous AMR surveys have all looked at AMR *E. coli*, it is useful to continue this trend for raw salmon to allow comparisons of AMR data between salmon and on raw meat (chicken, turkey, beef & pork). The inclusion of AMR *Listeria* in this survey follows the 2022 *Listeria* outbreak linked to smoked fish and therefore it would be useful to obtain data on *Listeria* in raw salmon to help fill an evidence gap.

The Specification

Tenders are invited to carry out a survey of AMR *E. coli* and *Listeria* found on raw, prepacked, farmed salmon fillets on retail sale in the UK. We anticipate the survey will be in two phases:

Lot 1. Survey design, sample collection at retail and transportation to the testing laboratory.

Lot 2. Microbiological testing, data analysis and reporting.

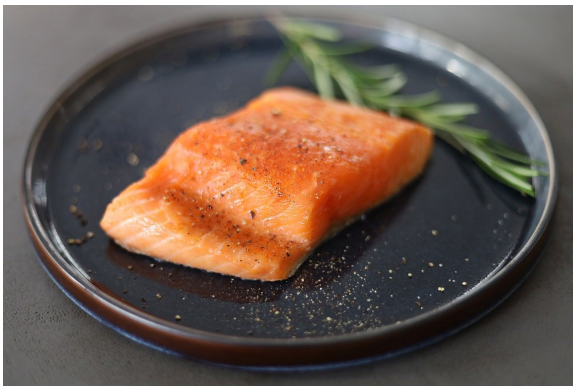
Ideally, our preference is for applicants to tender for both phases by working collaboratively, however separate tenders for both Lot 1 and 2 will also be considered. If the precise cost of any elements of the study is unknown, then the FSA will accept a range in the bids.

Lot 1: Survey design, sampling and transportation to the testing laboratory

Applicants should submit bids indicating a provisional sampling design for a survey of AMR *E. coli* and *Listeria monocytogenes* found on raw salmon from UK retail outlets. Individual items will need to be evenly sampled over a 12-month period from January 2024 to December 2024. Given the lack of UK data on *E. coli* and *Listeria* prevalence in raw salmon, we suggest sampling 300 salmon fillet samples (1 fillet per pack) as this will enable us to create a new baseline.

Sample collection

For this survey, only pre-packaged and labelled raw farmed salmon fillet is to be collected from retail supermarket outlets across the UK from January 2024 to December 2024. This will be salmon fillets available at retail, including those farmed in the UK waters and abroad (non-UK). Fresh (chilled) salmon fillets should be surveyed, and this should be easily identifiable from the packaging label. For this survey, fillets are small rectangular portions taken from a boneless side of salmon.



Please note that the following should **not** be included as part of this survey:

- Other types of fish species
- Frozen salmon
- Wild salmon varieties.
- Other cuts of salmon such as whole, side or half a side, tail, steaks, loins, diced, goujons, belly, etc.
- Salmon fillets sold ‘loose’ at fishmongers including fish counters within supermarkets.
- Prepared or processed salmon. This will include cooked or undergone some heat treatment (e.g., canned), hot or cold smoked, pre-marinated/seasoned, cured, dried, salmon containing other ingredients (e.g., ready meals, sushi, breaded or battered, etc.).

Sampling design

The FSA will provide data on the consumption of fresh, chilled salmon (kg) broken down by retailer, government office region, and month of the year (this is based on the Defra's latest Family Food dataset as derived from the 2019/20 Expenditure and Food Survey). We can also provide population data for local authorities, to aid sampling within regions. This information should be used to produce a sampling plan that is representative of UK market share for these factors.

Applicants should sample according to the marginal totals of market share data provided across retailers and should indicate how well represented different regions of the UK will be in their sampling. We encourage applicants to finalise sampling plans in discussion with FSA statisticians and microbiologists.

N.B. Care should be taken to avoid sampling multiple raw salmon from the same batch.

This survey and sampling design will be subject to expert peer-review as part of the FS900350 tender evaluation process. On award of the contract, the successful applicant will be required to submit a more detailed design reflecting the requirements as set out in this specification document.

Please note that the final survey and sampling design will be shared with, and approved by, the FSA before commencement of sample collection.

Collection of sample information and transportation to testing laboratory

In addition to the survey design, the contractors for Lot 1 will be expected to conduct the sampling and transportation of collected samples to the testing facility, ensuring that there is a robust system for sample identification and data recording, and that samples are handled appropriately, including use of methods to avoid cross-contamination and ensuring adequate temperature controls during transit, making sure all samples receive identical sampling and transportation processes. Close liaison with the testing laboratory is essential to ensure correct sample handling and agree delivery times, as well as for the transfer of sample information.

Samples must have sufficient time left on the use by date to ensure that they are still in date when tested. Once samples have been purchased, the manager of the retail outlet should be handed a letter that FSA will provide, explaining that a sample has been taken and what it will be used for.

The applicant should create an Excel spreadsheet database, which is password protected, of the samples collected with the following details being recorded for each sample at the point of sampling:

- A unique sample number (to be determined by the sampler)
- Date and time of purchase
- Retail outlet name and address
- Brand name (if any)
- Skin or skinless
- Product full text description

- Batch/lot number
- Local Authority approval/registration number (GB number, if available)
- Durability date (e.g., use by date or best before date)
- Country of origin information
- Product weight/size
- Type of packaging
- Sample purchase cost
- Storage and handling instructions, if available
- Farm details (e.g., name, address and postcode)
- Date and time sample dispatched to the testing laboratory
- Temperature of sample

Photographs must be taken of the raw farmed salmon fillet including any labelling present on the packaging. This shall ensure that all product information, including durability dates (e.g., use by or best before dates), any approval codes, storage and handling instructions, etc. are included. Each photograph should be assigned the corresponding unique sample number to allow for traceability. The Excel spreadsheet of samples should be provided to the testing facility monthly so that they can add the sample findings to the documents.

The contractor for Lot 1 will produce a report on the survey design and sampling plan within 30 days of the end of the sampling period and shall be submitted to FSA in a suitable and accessible format. An Excel spreadsheet line listing of the products collected, providing full sample details, shall also be submitted to FSA. A separate electronic file shall be provided to FSA containing the sample photographs.

Lot 2: Microbiological testing, data analysis, reporting and archiving of recovered bacteria and their AMR profiles.

Applicants are invited to submit bids to carry out the testing (detection[2], enumeration and antimicrobial susceptibility testing) of the prepacked, raw, farmed salmon fillets sampled at retail in the UK for *E. coli* and *Listeria* spp., as specified in Table 1 below.

Testing will be informed by the study design but will be based on a total of 300 raw salmon collected over a period of 12 months between January 2024 to December 2024. Applicants must ensure good quality control throughout the sample arrival/logging and analysis and long-term storage of samples.

Table 1. Requirements for AMR *E. coli* and *Listeria* testing in pre-packed, raw, farmed salmon fillets on retail sale in the UK.

Bacteria	Testing	Antimicrobial Susceptibility Testing (AST)* (Including screening of panel of antimicrobials and testing for the presence of specific resistance genes / resistance mechanisms)	Whole Genome Sequencing

[2] Includes identification and speciation.

Escherichia coli	Detection Enumeration	ESBL producers AmpC producers Carbapenems** Fluoroquinolones • Ciprofloxacin • Nalidixic acid Tetracycline Polymyxins • Colistin ** • Tigecycline • Transmissible colistin resistance (e.g., *mcr* genes)	Findings of particular concern (e.g., *mcr* positive colistin resistance genes, carbapenem resistance).
Listeria spp.	Detection (including speciation) Enumeration	Only *L. monocytogenes:* ESBL producers AmpC producers Ampicillin Carbapenems** Tetracycline Penicillin Meropenem Daptomycin Erythromycin Gentamicin Linezolid Trimethoprim Co-trimoxazole Vancomycin Fosfomycin Lincomycin Florphenicol	Findings of particular concern (e.g., *mcr* positive colistin resistance genes, carbapenem resistance).

* Antimicrobial susceptibility testing (AST) is the *in vitro* test of the sensitivity of a bacterium to one or more antibiotics. Suitable methods should be used to determine MIC (Minimum Inhibitory Concentration) for antimicrobial activity. It is expected that genotypic and phenotypic methods are used as appropriate. Breakpoints should be determined using ECOFF (Epidemiological cut off) values outlined in the Commission Implementing Decision (EU) 2020/1729 of 17 November 2020 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria and repealing Implementing Decision 2013/652/EU.

** Where the results show the presence of carbapenem resistance /carbapenemase production or colistin resistance / transmissible colistin resistance genes or abnormal/unusual results are found then these should be reported to FSA as soon as possible and the FSA will investigate further on a case-by-case basis.

The sampling and testing for *E. coli* is in accordance with the requirements set by the EU for the harmonised survey of AMR in retail meats, Decision 2020/1729 and Technical

Specification. This will allow the FSA to draw comparisons between the AMR *E. coli* findings of this survey with previous AMR *E. coli* in UK retail meat surveys. The applicant is advised to use the appropriate ISO accredited methods (see analytical requirement section below), for example ISO 11290-1 and 11290-2 for *Listeria*.

The testing facility is expected to use, at minimum, in-house validated methods; however, accreditation for the required methods and matrices is desirable. When not accredited, applicants must provide evidence of competence in conducting the required analyses, for instance through providing records of consistent satisfactory performance in relevant Proficiency Testing schemes from the last 18 months.

It is expected that the Testing Facility liaises closely with the Sampling Contractor in providing a preferred testing schedule so that sample collection and transportation plans may be arranged accordingly. The Sampling Contractor will provide the Testing Laboratory with an Excel spreadsheet each month allowing them to record the results. Each sample will be assigned a unique sample number by the sampling organisation and should be used throughout the testing phase thus allowing traceability of the findings to the correct sample. On receipt of the sample, the following information should be recorded:

- Date and time of receipt of sample by laboratory
- Temperature of sample on receipt
- Sample within the use-by date prior to testing (Yes or No)
- Date and time of testing

Archiving of samples

It is envisaged that one randomly selected isolate of *E. coli* and *Listeria monocytogenes* from each salmon fillet sample, which yields a confirmed AMR result, will be archived for a minimum of 5 years. As the intention is to be able to sequence the samples at a later date, if required, the samples should be stored accordingly. This will give the FSA (and others) flexibility to carry out further sequencing at a later date. Therefore, it's important that the isolates are stored under appropriate conditions which are fully explained in the proposal.

Analytical Requirements

The testing laboratory will be required to be UKAS accredited to ISO 17025 and ISO 11290 and use accredited methods of analysis, in accordance with the EU Decisions and Technical specifications. Applicants are expected to test the panel of antimicrobials as stated in the EU Decisions and Technical specifications in addition to those specified in Table 1. Suitable methods should be used to determine MICs for antimicrobial activity. It is expected that genotypic and phenotypic methods are used as appropriate e.g., for colistin resistance genes and for carbapenemase production. Breakpoints should be determined using ECOFF (Epidemiological cut off) values outlined in Commission Implementing Decision (EU) 2020/1729 of 17 November 2020 on the monitoring and reporting of antimicrobial resistance in zoonotic and commensal bacteria and repealing Implementing Decision 2013/652/EU.

Reporting of Adverse Results

It is important to ensure samples are analysed and reported to the FSA as soon as possible following their procurement, so appropriate action can be taken where necessary to protect public health. Any results of AMR concern (e.g., *mcr* positive colistin and carbapenem resistance) or of unusual pattern should be notified to the FSA as soon as possible.

Technical report
It is anticipated that the following will be delivered to the FSA as part of the testing and analysis:

- A technical report addressing the relevant areas of this survey which is in a suitable and accessible format for publication on the FSA website. The report will need to include a lay summary, executive summary, introduction (including the background and aims/objectives of the research), methodology, findings, discussions, conclusions, references and recommendations for further work. The final report discussions should also include a short assessment on the potential risk to consumers on any AMR findings found and another section on the relevance of the survey findings to the food safety commitments within the 2019-2024 AMR National Action Plan. The FSA will not be brand naming and therefore the report should be anonymised. Please note that the technical report should be submitted by February/March 2025 and will undergo an internal review followed by an external peer-review before it can be accepted by the FSA. A draft report should be submitted at least 6-7 weeks before the final report is due to allow FSA officials sufficient time to comment.
- A project initiation meeting at the start of the survey.
- A mid-point evaluation/review meeting to monitor progress and ensure the survey is on track.
- A meeting with FSA and other Government officials (e.g., VMD, FSS) to present the key findings from the survey.
- The Project Lead to attend and present the findings of this survey at a future ACMSF AMR sub-group meeting (to be determined).

Raw data from the testing and analysis should be provided in an Excel spreadsheet in both a non-anonymised (for FSA's use) and anonymised version that would allow access by others. This is in compliance with FSA's open data policy. Please note that the raw data should be in an accessible format and adequate steps taken to ensure data protection.

The FSA will be looking for competitive bids which give value for money. Applicants may submit a single tender for one or for both requirements, which addresses the criteria above.

References

Ben Mhenni, N., Alberghini, G., Giaccone, V., Truant, A., Catellani, P., 2023. Prevalence and Antibiotic Resistance Phenotypes of Pseudomonas spp. in Fresh Fish Fillets. Foods 12, 950. https://doi.org/10.3390/foods12050950

EU Harmonised Survey of Antimicrobial Resistance (AMR) on retail meats (Pork and Beef/Chicken) [WWW Document], 2020. . Food Stand. Agency. URL https://www.food.gov.uk/research/antimicrobial-resistance/eu-harmonised-survey-of-antimicrobial-resistance-amr-on-retail-meats-pork-and-beefchicken-0 (accessed 7.6.23).

EU Harmonised Survey of Antimicrobial Resistance (AMR) on retail meats (pork and beef/chicken) [WWW Document], 2015. . Food Stand. Agency. URL https://www.food.gov.uk/research/antimicrobial-resistance/eu-harmonised-survey-of-antimicrobial-resistance-amr-on-retail-meats-pork-and-beefchicken (accessed 7.6.23).

Higuera-Llantén, S., Vásquez-Ponce, F., Barrientos-Espinoza, B., Mardones, F.O., Marshall, S.H., Olivares-Pacheco, J., 2018. Extended antibiotic treatment in salmon farms select multiresistant

gut bacteria with a high prevalence of antibiotic resistance genes. PLoS ONE 13, e0203641. https://doi.org/10.1371/journal.pone.0203641
Ojasanya, R.A., Gardner, I.A., Groman, D.B., Saksida, S., Saab, M.E., Thakur, K.K., 2022. Antimicrobial Susceptibility Profiles of Bacteria Commonly Isolated from Farmed Salmonids in Atlantic Canada (2000–2021). Vet. Sci. 9, 159. https://doi.org/10.3390/vetsci9040159
Review on Antimicrobial Resistance, 2016.
Survey of Antimicrobial Resistance (AMR) Bacteria in Lamb and Turkey Meat on Retail Sale in the UK [WWW Document], 2020. Food Stand. Agency. https://doi.org/10.46756/sci.fsa.hlo814

The 'Tender Application Form' requests the supplier to complete information in the following headers. Please provide any essential requirements or project specific information relevant to the work being tendered. Ignore if not applicable.

Expertise required.

The applicant(s) either individually or collectively as part of a research group, should have recent, demonstrable expertise in:

- Designing and sampling for surveys including statistical input.
- Carrying out microbiological and AMR testing of raw fish according to EU decisions and technical specifications and ISO methods. The laboratory should demonstrate they are accredited to carry out this analysis as part of their application.
- A molecular microbiological background with sound knowledge of AMR, bacteriology, PCR and whole genome sequencing techniques.
- Knowledge of the salmon farming industry within the UK.
- Knowledge of *E. coli* and *Listeria* - Laboratory facilities suitable for working with both organisms (additional restriction apply to working with *Listeria*).

Cost

The FSA estimates that the cost for this survey to be in a range of £150k - £35k for Lot 1 (sampling) and £115k for Lot 2 (testing). The onus is on the contractor(s) to provide the costings they believe that is reasonable to meet the evidence gap as outlined in this survey specification and provide the justification of this within their proposal. The contractor(s) should be aware that one of the key criteria that all research proposals are evaluated against is 'value for money' which is delivering the survey asked for in this specification (including the anticipated outputs and benefits) at a competitive price.

Relevance to the AMR National Action Plan

As part of the tender summary within their proposal, the applicant will (using their own words) provide the background to this survey and summarise the proposed survey. This should also include an explanation on how this survey and the anticipated findings will inform or contribute to the food safety commitments made within the UK's 2019-2024 AMR National Action Plan.

Risk

The contractors are to complete a risk register as part of their proposal. They should list any anticipated risks (including scientific risks) to the delivery of the survey, ranking the likelihood and impact of the risk occurring and offer suggested actions/solutions to mitigate these risks.

Data protection

The contractor should outline within their tender whether they anticipate any Personal Data will be collected as part of the survey. If so, you should outline in your tender how you will comply with the General Data Protection Regulation (GDPR), recognising the commissioning authority's (the FSA's) role as the 'data controller' and the contractor's role as the 'data processor', and responding to the sections below. If successful and Personal Data is being collected, you may also be asked to carry out a Privacy Impact Assessment (PIA), and a privacy notice may be required, which will be reviewed by the FSA data security team.

Data security

Please confirm in your tender that you (and any sub-contractors) have in place, or that you will have in place by contract award, the human and technical resources to perform the contract to ensure compliance with the General Data Protection Regulation (GDPR) and to ensure the protection of the rights of data subjects.

Please provide details of the technical facilities and measures (including systems and processes) you have in place, or will have in place by contract award, to ensure compliance with the GDPR and to ensure the protection of the rights of data subjects. Your response should include, but should not be limited to facilities and measures:

- to ensure ongoing confidentiality, integrity, availability and resilience of processing systems and services.
- to comply with the rights of data subjects in respect of receiving privacy information, and access, rectification, deletion and portability of personal data.
- to ensure that any consent-based processing meets standards of active, informed consent, and that such consents are recorded and auditable.
- to ensure legal safeguards are in place to legitimise transfers of personal data outside the EU (if such transfers will take place).
- to maintain records of personal data processing activities; and
- to regularly test, assess and evaluate the effectiveness of the above measures.'

Dissemination

Please outline within your proposal whether you intend to submit a paper from the survey findings within an open access peer-review journal including any cost associated with this. Also list any proposed plans for presenting the findings at conference and workshops.

Quality

The Applicant (including any sub-contractors) for this project should demonstrate that they have the suitable level of proficiency in performing the sampling and all microbiological and AMR testing techniques as required by this survey. Ideally using one of those testing methods: EU Decisions and Technical specifications for AMR *E. coli* testing but also ISO 20776-1:2019 or equivalent, ISO/CD 13136-1 accreditation, ISO 11290 etc. This should not only include the lead applicant but also any sub-contractors listed under the Tender application. Applicant(s) should reflect the standards laid out in the 'Joint Code of Practice for Research' in their applications.

Social value

Social value has a lasting impact on individuals, communities and the environment. The Government has an opportunity and responsibility to maximise benefits effectively and comprehensively through its commercial activity. To be effective, it is essential that the FSA considers social value at all stages of the procurement life cycle. In order to do this, the FSA

is applying the Government Commercial Functions social value model PPN 06/20 Procurement Policy Note from 1st January 2021. The complete set of documents can be found on the Social Value webpage.

Using a maximum of 3,000 characters describe the commitment your organisation will make to ensure that opportunities under the contract deliver the **Policy Outcome** and **Award Criteria**.

The **Policy Outcome** selected for this tender is **'Wellbeing – Improve health and wellbeing'.** Tenderers should describe how they will demonstrate action to support health and wellbeing, including physical and mental health, in the contract workforce (**Award Criteria**).

Please include:

- Your 'Method Statement', stating how you will achieve this and how your commitment meets the Award Criteria, and
- a timed project plan and process, including how you will implement your commitment and by when. Also, how you will monitor, measure and report on your commitments/the impact of your proposals. You should include but not be limited to:
    - timed action plan
    - use of metrics
    - tools/processes used to gather data
    - reporting
    - feedback and improvement
    - transparency

Examples could include:

- Understanding of issues relating to health and wellbeing, including physical and mental health, in the contract workforce.
- Actions to invest in the physical and mental health and wellbeing of the contract workforce. Illustrative examples:
    - implementing the 6 standards in the Mental Health at Work commitment and, where appropriate, the mental health enhanced standards for companies with more than 500 employees in Thriving at Work with respect to the contract workforce, not just 'following the recommendations'
    - public reporting by the tenderer and its supply chain on the health and wellbeing of staff comprising the contract workforce, following the recommendations in the Voluntary Reporting Framework
    - engagement plans to engage the contract workforce in deciding the most important issues to address.

A Social Value Key Performance Indicator (KPI) will be agreed in the Contract based on the Suppliers response regarding the percentage of all companies in the supply chain under the contract to have implemented measures to improve the physical and mental health and wellbeing of employees.

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Technical Solution/ Deliverables: See Annex A – Technical Proposal
Price (UKHSA Financial Proposal): £100,514.30. See Annex B – Financial Proposal for full cost breakdown.
Payments & Invoicing Please submit invoices to fsa.payments@food.gov.uk for work with FSA. Please include the referring FSA purchase order number in the email title and within the invoice to allow Invoice/Purchase Order matching. Note that invoices that do not include reference to FSA Purchase Order number will be returned unpaid with a request for valid purchase order through email.
Foreground IPR – Ownership As detailed in overarching MoU
Personal Data: FSA is the Controller and UKHSA is the Processor. No personal data is to be processed as part of this agreement.
Special Terms (To include any terms or conditions not covered in the overarching MoU or any terms amended for the purposes of this Call Off Agreement): N/A
We confirm receipt of this Form seeking approval for the above project to proceed. We agree to provide the goods and/or services requested according to the terms and conditions set out in the MOU between FSA and UKHSA.

Signed by Work Order Representative:	FSA	UKHSA
	.....	Caroline Willis ...
Name:	.....	..Caroline Willis.....
Date:	……	…19.12.2023……..

Annex A – Technical Proposal

Tender Application form for a project with the Food Standards Agency

- Applicants should complete each part of this application as fully and as clearly as possible
- Brief instructions are given in the grey boxes at the start of each section.
- Please submit the application through the Agency's eSourcing Portal (Bravo) by the deadline set in the invitation to tender document.

LEAD APPLICANT'S DETAILS

Surname	WILLIS	First Name	CAROLINE	Initial		Title	DR
Organisation	UK HEALTH SECURITY AGENCY	Department	FOOD WATER AND ENVIRONMENTAL MICROBIOLOGY SERVICE				
Street Address	MANOR FARM ROAD						
Town/City	PORTON	Country	WILTSHIRE	Postcode	SP4 0JG		
Telephone No	01980 616775	E-mail Address	Caroline.willis@ukhsa.gov.uk				

Is your organisation is a **small and medium enterprise**. (EU recommendation 2003/361/EC refers http://www.hmrc.gov.uk/manuals/cirdmanual/cird92800.htm)	Yes		No	X

TENDER SUMMARY

TENDER TITLE

A survey of AMR E. coli and Listeria spp. on raw, prepacked, farmed salmon fillets on retail sale in the UK (Lot 2)

TENDER	**FS900350 - C210688**		
PROPOSED START	15/01/2024	**PROPOSED END**	31/05/2025

1: TENDER SUMMARY AND OBJECTIVES

A. TENDER SUMMARY

Please give a brief summary of the proposed work in no more than 400 words.

This proposal will meet the specification by working with a sampling contractor to ensure that samples are collected over one year from January 2024 according to the sampling protocol that will be agreed with the FSA. Samples will undergo the primary microbiological testing at the three UKHSA laboratories at Porton, London and York (with a small number of samples also being tested at the Agri-Food Biosciences Institute Northern Ireland (AFBINI) laboratory as some salmon suppliers are unique to NI). The testing will be carried out using standard, UKAS accredited procedures for the detection and enumeration of *Listeria* species and the enumeration of generic *E. coli*. In-house methods, based on the EU method for harmonized monitoring, will be used to examine the samples for detection of generic *E. coli* and *E. coli* with phenotypic resistance to cefotaxime, carbapenems and/or colistin. An isolate of each bacterial type from each positive sample will be submitted to subcontractor laboratories for further characterisation and AMR determination. The Animal and Plant Health Agency (APHA) will be responsible for undertaking the MIC testing of the *E. coli* isolates according to EU protocols using validated dilution methods (and thresholds stipulated by the European Committee on Antimicrobial Susceptibility Testing (EUCAST)) with staff, facilities and equipment accredited to the ISO17025 standard. PCR and

sequencing of amplicons will be performed on confirmed ESBL/AmpC *E. coli* to verify the underlying genetic determinants and isolates with phenotypic resistance to colistin will be tested for *mcr* genes by PCR. The AFBINI will undertake MIC testing for *L. monocytogenes* isolates. *L. monocytogenes* isolates will be characterised by Whole Genome Sequencing (WGS), and those showing the presence of acquired resistance genes will be tested for antimicrobial sensitivity. WGS data for *L. monocytogenes* isolates will be compared to UKHSA databases to determine whether any isolates cluster with isolates from patient cases of listeriosis. Isolates will be stored for five years. Significant results will be reported to the FSA regularly throughout the testing period, and final results will be presented as a report to the FSA by the end of the project.

B. OBJECTIVES AND RELEVANCE OF THE PROPOSED WORK TO THE FSA TENDER

OBJECTIVES

Please detail how your proposed work can assist the agency in meeting it stated objectives and policy needs. Please number the objectives and add a short description. Please add more lines as necessary.

OBJECTIVE NUMBER	OBJECTIVE DESCRIPTION
01	Agree the sampling plan and the final testing protocol with the FSA and sampling contractor
02	Examine salmon samples for the presence of *Listeria* and *E. coli* (including enumeration of these and specific detection of *E. coli* on cefotaxime/carbapenem/colistin plates) and confirm identity of isolates.
03	Retain isolates of each type of organism from each positive sample for MIC and other relevant testing as specified in the testing protocol.
04	Perform MIC testing on isolates submitted by the primary testing laboratories.
05	Perform WGS to determine *Listeria* sub-type and the presence of specific antibiotic resistance genes.
06	Perform PCR and sequencing to identify genetic determinants in ESBL/AmpC-producers and *mcr* genes.
07	Project meeting with the FSA to present and discuss results and agree on format and content of a final report.
08	Submit data reports according to those scheduled in the deliverables and write up results as a final report for the FSA.

2: DESCRIPTION OF APPROACH/SCOPE OF WORK

A. APPROACH/SCOPE OF WORK

Please describe how you will meet our specification and summarise how you will deliver your solution. You must explain the approach for the proposed work. Describe and justify the approach, methodology and study design, where applicable, that will be used to address the specific requirements and realise the objectives outlined above. Where relevant (e.g. for an analytical survey), please also provide details of the sampling plan.

This proposal will meet the specification by working with a sampling contractor to ensure that samples are received and tested from January 2024 according to the sampling protocol that will be agreed with the FSA.
Samples will be delivered to the three UKHSA laboratories at Porton, London and York under appropriate transit conditions, so that primary testing can be undertaken within a suitable timescale to minimise microbial change.
These laboratories have extensive experience of testing raw and ready-to-eat fish products for a range of bacterial parameters including *Listeria* and *E. coli*.

Background
A review of prevalence of *L. monocytogenes* and *E. coli* including AMR indicator *E. coli* in raw fish indicates a relatively low prevalence of ESBL *E. coli*, but a potential prevalence of 15-20% for *L. monocytogenes*. For example,
generic *E. coli* and ESBL were detected in 15 and 1, respectively, of 30 raw retail salmon samples in Portugal (Silva et al. 2019) and ESBL were detected in 1 of 28 raw salmon samples on retail sale in Spain (Vitas et al. 2018). Janecko et al. (2023) detected *E. coli* in 30% of 157 samples of salmon, with higher prevalence in imported salmon compared to domestically produced fish. In a study of

102 raw marine fish in Poland, *L. monocytogenes* was detected in 18% (Wieczorek and Osek, 2017); resistance to ceftriaxone, oxacillin and clindamycin were found in these. A further study in a Polish fish processing plant detected *L. monocytogenes* in 32 of 119 samples (27%) (Skowron, 2018), and 4 of these were resistant to at least 3 antibiotics, including penicillin, ampicillin, meropenem, erythromycin and trimethoprim/sulfamethoxazole.

Based on these studies we have estimated numbers of isolates for MIC testing for the purpose of planning and cost estimates to be up to 15 for ESBL/AmpC producing *E. coli* / colistin-resistant or carbapenemase-producing *E. coli* (i.e. approx. 5% of samples positive), while for generic *E. coli* up to 150 isolates can be expected (assuming approximately 50% positive by either an enrichment method and/or enumeration). For *L. monocytogenes* we estimate 20% prevalence (i.e. 60 isolates for WGS testing).

Methodology

We propose to undertake detection and enumeration of *Listeria* and *E. coli*, including detection of *E. coli* with phenotypic resistance to cefotaxime, carbapenems and/or colistin at the UKHSA laboratories in Porton, London, and York (a small number would also be sampled and tested at AFBI in NI to include products from NI). (In this context, 'phenotypic resistance' is based on interpretation according to ECOFF thresholds to distinguish non-wild-type phenotypes from (susceptible) wild-type ones; The Advisory Committee on the Microbiological Safety of Food (ACMSF) Working Group (WG) on AMR have been tasked by the FSA to produce a guidance paper around the use of AMR terminology when reporting the AMR findings from FSA-funded projects – we will consider the recommendation from the ACMSF AMR WG paper on terminology when available and reflect these in the coming reports from this study).

For *E. coli,* one isolate of each bacterial type from every positive sample will be retained and sent to APHA for determination of the MIC using the broth dilution methods according to the procedures described by the European Committee on Antimicrobial Susceptibility Testing (EUCAST).
In addition, PCR and sequencing of amplicons will be performed on relevant *E. coli* isolates to identify presence of ESBL/AmpC-related determinants and isolates with phenotypic resistance to colistin or the carbapenems will be screened for *mcr* genes, and acquired carbapenemase genes, respectively
For *L. monocytogenes*, as these are usually intrinsically resistant to at least three different classes of antibiotics (e.g. associated with *fosX, lin, norB, sul, pbp* genes) and acquisition of resistance genes (e.g. tetracyclines (*tetM*), trimethoprim (*dfrD*), lincosamides (*lnuG*), macrolides (*ermB, mphB*) and phenicols (f*exA*)) is rare, we propose to predict AMR profiles from WGS data in the first instance. One *L. monocytogenes* isolate from each positive sample will be subjected to WGS at the collaborating Quadram Institute Bioscience (QIB) and antimicrobial resistance profiles will be inferred from the WGS data. To assess concordance between phenotypic and genotypic data we propose to MIC test any isolate with predicted acquired resistance and representative isolates of those with only intrinsic resistance (either using the disc diffusion or E-test MIC test methods for these isolates at the AFBI NI laboratory e.g. EUCAST Disk Diffusion Method for Antimicrobial Susceptibility Testing advised for Listeria (2022), Manual_v_11.0_EUCAST_Disk_Test_2023.pdf). All isolates will be retained for five years beyond the end date of the contract.

It is proposed that results will be discussed with FSA by means of a project meeting in January 2025, with a final report being delivered in agreement with the agreed deliverable dates.

References

Janecko N, Zamudio R, Palau R, Bloomfield S and Mather A. Repeated cross-sectional study identifies differing risk factors associated with microbial contamination in common food products in the United Kingdom. Food Microbiol. 2023; 111:104196. doi: 10.1016/j.fm.2022.104196.

Silva V, Nunes J, Gomes A, Capita R, Alonso-Calleja C, Pereira JE, Torres C, Igrejas G, Poeta P. Detection of Antibiotic Resistance in Escherichia coli Strains: Can Fish Commonly Used in Raw Preparations such as Sushi and Sashimi Constitute a Public Health Problem? J Food Prot. 2019; 82:1130-1134. doi: 10.4315/0362-028X.JFP-18-575.

Skowron K, Kwiecińska-Piróg J, Grudlewska K, Świeca A, Paluszak Z, Bauza-Kaszewska J, Wałecka-Zacharska E, Gospodarek-Komkowska E. The occurrence, transmission, virulence and antibiotic resistance of

Listeria monocytogenes in fish processing plant. Int J Food Microbiol. 2018; 282:71-83. doi: 10.1016/j.ijfoodmicro.2018.06.011.

Vitas AI, Naik D, Pérez-Etayo L, González D. Increased exposure to extended-spectrum β-lactamase-producing multidrug-resistant Enterobacteriaceae through the consumption of chicken and sushi products. Int J Food Microbiol. 2018; 269:80-86. doi: 10.1016/j.ijfoodmicro.2018.01.026.

Wieczorek K, Osek J Prevalence, genetic diversity and antimicrobial resistance of Listeria monocytogenes isolated from fresh and smoked fish in Poland. Food Microbiol. 2017 64:164-171. doi: 10.1016/j.fm.2016.12.022.

B. INNOVATION

Please provide details of any aspect of the proposed work which are considered innovative in design and/or application? E.g. Introduction of new or significant improved products, services, methods, processes, markets and forms of organization

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3: THE PROJECT PLAN AND DELIVERABLES

A. THE PLAN

Please provide a detailed project plan including, the tasks and sub-tasks required to realise the objectives (detailed in Part 1). The tasks should be numbered in the same way as the objectives and should be clearly linked to each of the objectives. Please also attach a flow chart illustrating the proposed plan.

1. Reception of samples at the laboratory (staff at UKHSA FWEMS Porton, York and Colindale (including Caroline Willis, Frieda Jorgensen, Ellen Murphy, Paz Aranega Bou and Kartyk Moganeradj) and at AFBINI (Nicolae Corcionivoschi):
   - Sample receipt details will be recorded on the sample submission form (e.g. temperature on receipt and time of receipt as well as any notes on the state of the packaging on receipt)
   - The sample will be logged with a unique laboratory sample number into the Laboratory Information Management System (LIMS) that will allow traceability throughout sample analysis and storage as well as further results from testing of the bacterial isolates arising from the sample
   - Verification that the details of the actual sample agree with the sample information recorded by the Surveyor on the sample submission form
   - Recording of the temperature of the samples on receipt; those at temperatures above 8 will not be tested
   - Should a sample be rejected on receipt (e.g., if beyond its use-by date) the Surveyor would be notified, and the laboratory would make appropriate arrangements with the Surveyor to receive any re-sampled samples.
   - If required by the Surveyor the laboratory would access any relevant sampling system portal and confirm receipt of the samples
   - Samples would be stored chilled on receipt and tested within the specified shelf-life but preferably with 24 hours of sample receipt

2. Testing of samples (staff at UKHSA FWEMS Porton, York and Colindale and AFBINI as for Task 1)

   Testing of samples will take place at UKHSA FW&E laboratories at Porton, London and York and the AFBI laboratory in Northern Ireland.

   The procedures described below will be used to detect/enumerate the specified bacteria.

   It is proposed that one single isolate of each bacterial species per sample and per isolation medium type will be selected for MIC testing in order to avoid biased results due to multiple counting of copy strains. This is an approach that was also used by Willis et al. during FSA project FS430677 and Jorgensen et al during FSA project FS900253.

   In addition to methods that ascertain the prevalence of AMR in the general population of isolates (by performing MIC testing on isolates of *E. coli* detected by standard methods and inferring AMR profiles from WGS data for *Listeria*), selective approaches to estimate the

prevalence of samples containing specific AMR bacteria will also be used. Targeted isolation of AMR bacteria is described in standard EU protocols (e.g. isolation of bacteria producing ESBLs using plates containing cefotaxime (CTX)). This additional test would enable the prevalence of putative AMR *E. coli* to be sensitively ascertained in the samples tested and would include MIC testing of presumptive ESBL producers. Similarly, enrichment followed by plating onto suitable media will also be used for the detection of colistin-resistant *E. coli* and carbapenemase-producing *E. coli*.

i. Detection of *Listeria* – based on ISO 11290-1; 2017.
Listeria will be detected using enrichment of 25 g sample in Half Fraser broth, followed by selective enrichment and finally sub-culture onto selective agars. Presumptive positive colonies will be confirmed using MALDI-TOF or biochemical testing, according to each laboratory's accredited procedure. Results will be reported as 'detected / not detected in 25 g'. One isolate from every positive sample will be characterized by WGS (an estimated 60 isolates). Where WGS indicates the presence of acquired AMR genes, MIC testing will be undertaken.

ii. Detection and enumeration of *E. coli* – based on ISO 16649-2; 2015
E. coli will be enumerated by plating a 10^{-1} dilution of homogenate (and further dilutions) to chromogenic agar to allow the detection of typical *E. coli* colonies. Results will be reported as CFU per g. One isolate from every positive sample (an estimated 150) will be MIC tested. In addition, an enrichment broth will be incubated overnight and sub-cultured onto a chromogenic plate, in order to allow detection of *E. coli* in 25 g. An isolate from this plate may be used for MIC determination in the absence of *E. coli* colonies on the corresponding enumeration plates.

iii. Detection of cefotaxime-resistant *E. coli* – EU method
Samples will be tested for the presence of ESBL/AmpC producers according to EU protocols e.g. "*Isolation of ESBL, AmpC and carbapenemase producing E. coli from fresh meat*" version 3, October 2015 – see http://www.eurl-ar.eu/data/images/protocols/esbl_ampc_cpeprotocol_version_meat_october2015_version3.pdf. Briefly, this involves non-selective enrichment in BPW, followed by sub-culture onto MacConkey agar + 1 mg/L cefotaxime (McCon+CTX). Isolates (an estimated 15) derived from such plates will be submitted for MIC testing as described in point (4) below.

iv. Detection of colistin-resistant and carbapenemase-producing *E. coli*
After overnight incubation, the enriched sample will also be sub-cultured onto selective agar plates, in order to allow detection of colistin-resistant and carbapenemase-producing *E. coli* in 25 g. The quality of such plates will be assured by APHA, who have expertise in verifying the performance of these specific plates. One *E. coli* isolate from each sample giving positive results on selective plates will be subjected to MIC testing as described below.

3. Transport of isolates to collaborating laboratories for WGS and MIC testing:
E. coli isolates will be retained on agar slopes and will be sent to APHA in batches throughout the test period for MIC determination. Once sufficient isolates have been collected, MIC testing will commence.
Listeria isolates will be sent to QIB as they are detected, for further typing and detection of AMR determinants by WGS.

4. Determination of MICs:
The MIC testing of *E. coli* isolates will be performed by APHA. It is expected that at least 150 generic *E. coli* isolates will be subjected to MIC testing, as well as 15 ESBL/AmpC producing *E. coli*.

The following procedures will be used:

MIC will be performed using dilution methods as described by EUCAST and the Laboratory Standards Institute (CLSI), accepted as the international reference method (ISO standard 20776-1:2006) EN 14.11.2013 Official Journal of the European Union L 303/33.
MICs will be determined in accordance with the up to date guidance located at: Sensititre EU Surveillance
Salmonella/E. coli EUVSEC Plate

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:303:0026:0039:EN:PDF. Microtitre plates will be used to perform these analyses. Isolates will be tested using Sensititre EU Surveillance Salmonella/E. coli EUVSEC Plate 1 (currently consisting of a panel of 14 antibiotics, although the plate design may change next year: https://assets.thermofisher.com/TFS-Assets/MBD/brochures/Sensititre-Plate-Guide-Booklet-EN.pdf:). Isolates showing microbiological resistance to third generation cephalosporins (cefotaxime or ceftazidime) or meropenem using the epidemiological cut-off values described by EFSA, will be tested against a further panel of 10 antibiotics (Sensititre EU Surveillance Salmonella/E. coli EUVSEC Plate 2).
Results will be interpreted using the epidemiological cut-off values outlined in the document http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:303:0026:0039:EN:PDF

5. WGS of Listeria isolates
Listeria isolates will first be characterized using WGS. This will be performed by the Quadram Institute Bioscience (QIB). Where evidence is observed of acquired AMR genes in the WGS data, isolates will be further assessed by the AFBINI laboratory using graduated test strips (E-Test) or antibiotic sensitivity discs to determine MICs according to standard protocols.
Subject to agreement with the FSA, the prevalence of plasmids and determinants of heavy metal and biocide resistance, as well as other genetic elements associated with virulence and persistence in the *L. monocytogenes* isolates may be established from the WGS data.

One isolate from each positive sample will be retained for five years on cryogenic beads held at -40°C.

6. PCR and WGS for characterization of antibiotic resistant determinants in *E. coli*
Confirmed ESBL/AmpC-producing *E. coli* will be subjected to a multiplex PCR to determine the presence of *bla*$_{CTX-M}$, *blaOXA*-1, *bla*$_{SHV}$, *bla*$_{TEM}$ genes (Randall *et al*. 2011). Should the multiplex PCR fail to detect any of these targets in ESBL *E. coli*, WGS will be performed to ascertain genetic determinant(s) for the ESBL phenotype. *E. coli* isolates with phenotypic resistance to colistin or the carbapenems (MICs above the colistin ECOFF or EUCAST screening cut-offs for the carbapenems) will be screened for plasmid-encoded *mcr* genes and acquired carbapenemase genes, respectively.

7. Notification of results of concern
Confirmed carbapenem-resistant E. coli would be notified immediately.
Discussion with project team to be undertaken regarding significance of Listeria results in raw (non ready-to-eat) fish. If patient cases known to be associated with Listeria strains from salmon, this would be promptly communicated to the FSA Incident Team (copying in the project team).

8. Submission of protocol and reports to the FSA:
(staff at UKHSA FWEMS as for task 1; staff at APHA (Catherine Fearnley and Muna Anjum), staff at UKHSA Colindale (Corinne Amar and Anais Painset) and staff at AFBINI (Nicolae Corcionivoschi and Catherine Couzens)

The final protocol will be reviewed together with the FSA as soon as possible and discussed at the first project meeting. For the first data report we are expecting to have tested ~ 50% of samples and would review the outcome of the primary testing in relation to expected number of isolates and any significant outcomes of any WGS testing performed. For the 2nd data report we expect all MIC and WGS data can be included and we will review any outstanding work. This may entail consideration of undertaking further MIC or WGS testing of any archived isolates. The structure of the final technical report will be agreed with the FSA in advance of submission. The final technical report should be suitable for publication on the FSA website and structured and formatted in a format suitable for publication on the FSA website. We will also reflect recommendations on the use of AMR terminology as provided in the forthcoming guidance paper expected from the ACMSF AMR WG paper. The technical report will include a lay summary, an executive summary, introduction (including background and aims/objectives of the survey), methodology, findings, discussion, overall conclusions, recommendations for further work, references and appendices. We will also include some text explaining how the survey

findings are feeding into the FSA's food safety commitments within the UK AMR National Acion Plan.

Once received, the final report will undergo a peer-review process prior to being accepted by the FSA – we will consider any comments received from the peer-reviewers and amend the report where appropriate.

B. DELIVERABLES

Please outline the proposed project milestones and deliverables. Please provide a timetable of key dates or significant events for the project (for example fieldwork dates, dates for provision of research materials, draft and final reporting). Deliverables must be linked to the objectives.
For larger or more complex projects please insert as many deliverables /milestones as required.
Each deliverable should be:

i. no more 100 characters in length
ii. self-explanatory
iii. cross referenced with objective numbers i.e., deliverables for Objective 1 01/01, 01/02 Objective 2 02/01, 02/02, etc.

Please insert additional rows to the table below as required.

A final deliverable pertaining to a retention fee of 20 % of the total value of the prosed work will automatically be calculated on the financial template.

DELIVERABLE NUMBER OR MILESTONE IN ORDER OF EXPECTED	TARGET DATE	TITLE OF DELIVERABLEOR MILESTONE
D1	**20/01/2024**	**Submit finalised sampling strategy and testing protocol to the FSA (Objective 1/01)**
M1	January 2024	Objective 2/01: Sampling commences (Objective 2/01)
D2	**30/06/2024**	**Submit data report 1 on confirmed detection of Listeria and E. coli to the FSA (Objective 2/02)**
D3	**31/12/2024**	**Submit data report 2 on confirmed detection of Listeria and E. coli to the FSA (Objective 2/02)**
M2	31/12/2024	All isolates received by APHA for MIC analysis (Objective 3/01)
M3	28/02/2025	Completion of MIC testing (Objective 4/01)
M4	28/02/2025	Completion of WGS and analysis of results (Objective 5/01)
M5	28/02/2025	Completion of PCR and analysis of results (Objective 6/01)
D4	**31/03/2025**	**Objective 4/02: Submit data report 3 on completed detections of L. monocytogenes and E. coli data; MIC and WGS data to the FSA (Objective 4/02)**
D5	**30/04/2025**	**Objective 4/02: Submission of final technical report to the FSA (Objective 4/02)**
M6	15/05/2025	Objective 7/01: Completion of project meeting to review report (Objective 7/01)
D6	**31/05/2025**	**Objective 8/01: Finalised report submitted to the FSA (Objective 8/01)**

4: ORGANISATIONAL EXPERIENCE, EXPERTISE and STAFF EFFORT

A. PARTICIPATING ORGANISATIONS' PAST PERFORMANCE

Please provide evidence of up to three similar projects that the project lead applicant and/or members of the project team are currently undertaking or have recently completed. Please include:

- The start date (and if applicable) the end date of the project/(s)
- Name of the client who commissioned the project
- Details of any collaborative partners and their contribution
- The value

- A brief description of the work carried out.
- How the example(s) demonstrate the relevant skills and/or expertise.
- What skills the team used to ensure the project (s) were successfully delivered.

The UKHSA has a proven record in being awarded grant funding, leading and participating in large-scale, scientific studies and delivering outputs from those studies within defined timescales. Within the Science Group of UKHSA, the FWEMS laboratories provide routine testing of food and environmental samples, supporting local authorities and port health authorities to carry out their duties. They are also regularly contributing to testing required as part of surveys/studies.

Examples of recent projects are:

1. **FSA project FS900253 – Surveillance of antimicrobial resistant in bacteria in raw dog and cat food on retail sale in the UK (Lot 2 – Microbiological testing, data analysis and reporting)**
   - Work led by UKHSA
   - 1st February 2023 – 31st June 2024
   - Name of client who commissioned the project: FSA
   - Collaborative partner: APHA and AFBI, and sampling provided by HallMark
   - Value: ~ £227,000

Performing microbiological testing of raw dog and cat food samples for the presence of *Salmonella,* STEC, *Campylobacter*, MRSA and *E. coli*, (including detection of presumptive ESBL/AmpC-producing *E. coli* or with reduced susceptibility to carbapenems and/or colistin). Dilution-based MICs testing on isolates obtained. Coordinating the testing activities at three different laboratories and MIC, PCR and WGS testing at two further collaborating centres. Coordinating with sampling sub-contractor to ensure that samples were received at the appropriate laboratories and in a suitable condition for testing. Attending meeting with the FSA and writing project report for the FSA.

- Demonstration of relevant skills and or expertise:

Good management skills within UKHSA, testing for isolation of *E.coli* using standard procedures based on ISO methods in laboratories accredited to 17025 standard, identification of bacteria by biochemical and/or Maldi-Tof/PCR-based methods; MIC testing according to methodology in retained EU protocols, and submission of final report to the FSA.

- What skills the team used to ensure the project was successfully delivered;
  - Project management
  - Communication with co-contractors, subcontractors and the FSA
  - Data management combining at least four data sources and statistical data analysis
  - Constant monitoring of data outputs and data linking to ensure robust MIC data linked to sample meta data etc.

2. **FSA project FS430667 - Survey of Salmonella, E. coli and antimicrobial resistance (AMR) in frozen, part-cooked breaded or battered poultry products at retail sale in the UK**
   - Work led by UKHSA
   - 1st March 2021 to 30th September 2021
   - Name of client who commissioned the project: FSA
   - Collaborative partner: APHA and Agri-Food Biosciences Institute (AFBI), Belfast, and sampling provided by subcontractor (HallMark)
   - Value: ~ £150,000

Performing microbiological testing of frozen reformulated chicken samples for the presence of *Salmonella* and *E. coli*, (including detection of presumptive ESBL/AmpC-producing *E. coli*. Dilution-based MICs testing on isolates obtained. Coordinating the testing activities at three different laboratories and MIC, PCR and WGS testing at two further collaborating centres. Coordinating with sampling sub-contractor to ensure that samples were received at the appropriate laboratories and in a suitable condition for testing. Attending meeting with the FSA and writing project report for the FSA.

- Demonstration of relevant skills and or expertise:

Good management skills within UKHSA, testing for isolation of *Salmonella* and *E. coli* using standard procedures based on ISO methods in laboratories accredited to 17025 standard, identification of bacteria by biochemical and/or Maldi-Tof/PCR-based methods; MIC testing according to methodology in retained EU protocols, and submission of final report to the FSA.

- What skills the team used to ensure the project was successfully delivered;
  - All of the above skills

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3. **FSA project FS101196 - Surveillance Study of Antimicrobial Resistance (AMR) in Campylobacter on Chicken and AMR in Salmonella on Pork sampled at retail**
   Work led by UKHSA
   - 1st September 2017 to 28th February 2018

- Name of client who commissioned the project: FSA
- Collaborative partner: APHA and AFBI, with meat samples provided by subcontractor (HallMark)
- Value: £261,582

Work performed – Performing microbiological testing of chicken and pork samples for the presence of Campylobacter, Salmonella, E. coli, Klebsiella and enterococci and performing MICs on isolates obtained. Coordinating the testing activities at three different laboratories and MIC and PCR testing at two further collaborating centres. Also coordinating with sampling contractor to ensure that samples were received at the appropriate laboratories and in a suitable condition for testing. Attending meeting with the FSA and writing an end of project report for the FSA.
Examples of skills and expertise – Routine bacteriology for isolation of bacteria using standard procedures, identification of bacteria by biochemical and molecular methods, and performing of MICs. Project management, updating the FSA via e-mails, teleconference. Submission of final report to the FSA.
Skills used by team to ensure successful delivery – All of the above skills

B. NAMED STAFF MEMBERS AND DETAILS OF THEIR SPECIALISM AND EXPERTISE

For each participating organisation on the project team please list: the names and grades of all staff who will work on the project together with details of their specialism and expertise, their role in the project and details of up to 4 of their most recent, relevant published peer reviewed papers (where applicable). If new staff will be hired to deliver the project, please detail their grade, area/(s) of specialism and their role in the project team.

Lead Applicant	UKHSA

Named staff members, details of specialism and expertise.

Dr Caroline Willis (G6) is the Head of the UKHSA FWEMS Porton laboratory. She is a Food Examiner and has particular areas of expertise in food, water and environmental testing in the hospital environment, antimicrobial resistance and examination of imported foods. She also acts as the FWEMS Laboratories' coordinator for testing of bivalve molluscan shellfish, including regular liaison with colleagues at CEFAS.
Project Role: Principal investigator. Responsible for project oversight and testing carried out at the Porton Laboratory. Responsible for final project report and presentations.
Publications (57) include:

1) **Willis C,** Jorgensen F, Cawthraw S, Aird H, Lai S, Kesby M, Chattaway M, Lock I, Quill E and Raykova G (2023) A survey of Salmonella, Escherichia coli and antimicrobial resistance in frozen, part-cooked, breaded or battered chicken products on retail sale in the United Kingdom. *Journal of Applied Microbiology* 134:1-9.
2) **Willis C,** McLauchlin J, Aird H, Jorgensen F, Lai S and Sadler-Reeves L. (2022) An assessment of the microbiological quality and safety of unpasteurised milk cheese for sale in England during 2019 - 2020. *Journal of Food Protection* 85: 278-286.
3) Davies N, Jorgensen F, **Willis C,** McLauchlin J and Chattaway M (2022) Whole genome sequencing reveals antimicrobial resistance determinants (AMR genes) of *Salmonella* enterica recovered from raw chicken and ready-to-eat leaves imported into England between 2014 and 2019. *Journal of Applied Microbiology* 133: 2569-2582.
4) **Willis C**, McLauchlin J, Aird H, Amar, C. Barker C, Dallman T, Elviss N, Lai S and Sadler-Reeves L. (2020) Occurrence of *Listeria* and *Escherichia coli* in frozen fruit and vegetables collected from retail and catering premises in England, 2018-2019. *International Journal of Food Microbiology* 334

Dr Frieda Jorgensen (AFC8) is the R&D coordinator for the FWEMS. Frieda has an MSc in Food Science and a PhD in Food Microbiology and has comprehensive experience with arranging sampling, microbiological testing and data analysis from similar surveys. She was responsible for managing a survey of retail chicken to monitor campylobacter and is currently PI on a survey to ascertain prevalence of pathogens and AMR bacteria in raw pet foods. She was a project manager on project FSA project FS430667 demonstrating delivery of all aspects of the project and led a recent review of AMR in campylobacters from UK chicken
Project Role: Will co-ordinate testing activities with QIB contractor and liaise on outcomes of WGS data. Responsible for supervision of data-linking and data curation.
Publications (70) peer reviewed include:

1) **Jørgensen F**, McLauchlin J, Verlander NQ, Aird H, Balasegaram S, Chattaway MA, Dallman T, Herdman MT, Hoban A, Lai S, Larkin L, McCormick J, Reeves LS, Willis C. Levels and genotypes of *Salmonella* and levels of *Escherichia coli* in frozen ready-to-cook chicken and turkey products in England tested in 2020 in relation to an outbreak of S. Enteritidis. (2022). Int J Food Microbiol. 369:109609. doi: 10.1016/j.ijfoodmicro.2022.109609.
2) Davies, N., **Jørgensen, F**., Willis, C., McLauchlin, J., Chattaway, M.A. Whole genome sequencing reveals antimicrobial resistance determinants (AMR genes) of *Salmonella enterica* recovered from raw chicken and ready-to-eat leaves imported into England between 2014 and 2019. (2022). Journal of Applied Microbiology, 133:2569-2582. doi: 10.1111/jam.15728.

3) Kaindama L., Jenkins C., Aird H., **Jorgensen F**., Stoker K. and Byrne L. (2021). A cluster of Shiga Toxin-producing Escherichia coli O157:H7 highlights raw pet food as an emerging potential source of infection in humans. Epidemiol Infect. 149:e124. DOI: 10.1017/S0950268821001072.
4) Humphrey TJ, **Jørgensen F**, Frost JA, Wadda H, Domingue G, Elviss NC, Griggs DJ and Piddock LJV. (2005) Prevalence and Sub-types of Ciprofloxacin-resistant Campylobacter spp. in Commercial Poultry Flocks Before, During and After Treatment with Fluoroquinolones. Antimicrob. Agents Chemother. 49: 699-707.

Dr. Kartyk Moganeradj (G7) is scientific lead for the FWEMS Laboratory, London. He is an experienced public health microbiologist with experience in DNA sequencing and microbial genotyping technologies. He will be responsible for the implementation of protocols and project implementation at the London laboratory.
Project role: Coordination of London testing and data reports, and liaison with WGS-derived SNP-typing data
Publications include:
1) Hameed S, **Moganeradj K**, Mahmood N, McHugh TD, Chaudhry MN, Arnold C (2017) Sequence analysis of the rifampicin resistance determining region (RRDR) of rpoB gene in multidrug resistance confirmed and newly diagnosed tuberculosis patients of Punjab, Pakistan. PLoS One, 12(8):e0183363
2) **Moganeradj K,** Rajendram D, Khadge S, Sonnenberg P, Abubakar I, et al. (2016) Insertion element IS6110 based characterisation of Nepalese tuberculosis strains into different genetic lineages. Clin Microbio Infect Dis, 1.

Dr Paz Aranega Bou (G7) is scientific lead for the FWEMS Laboratory, Porton. She is an applied microbiologist and has knowledge and experience in culture-based and PCR-based technologies for the detection, enumeration and characterisation of microorganisms from environmental samples.
Project role: Coordination of Porton testing and data reports, and liaison with contractor providing MIC testing
Publications include:
1) **Aranega-Bou P**., Brown N., Stigling A., D'Costa W., Verlander N.Q., Pottage T., Bennet A., & Moore G. (2023). Laboratory Evaluation of a Quaternary Ammonium Compound-Based Antimicrobial Coating Used in Public Transport during the COVID-19 Pandemic. Applied and Environmental Microbiology 2023; 0: e01744-22.
2) **Aranega-Bou P**., Ellaby N., Ellington M.J., Moore G. (2021). Migration of Escherichia coli and Klebsiella pneumoniae Carbapenemase (KPC)-Producing Enterobacter cloacae through Wastewater Pipework and Establishment in Hospital Sink Waste Traps in a Laboratory Model System. Microorganisms, 9(9):1868.

Ellen Murphy (G7) is scientific lead for the FWEMS Laboratory, York. She has a PhD in Veterinary Epidemiology and Public Health and specialises in the transmission of zoonotic pathogens through the food chain. She has extensive microbiological experience including in bacterial culture, PCR and AMR screening.
Project role: Coordination of primary testing at lab and associated data reports; liaison with sampling sub-contractor
1) Arden K, Gedye K, Angelin-Bonnet O, **Murphy E**, Antic D (2022), Yersinia enterocolitica in wild and peridomestic rodents within Great Britain, a prevalence study. Zoonosis and Public Health; 69 (5):537-549
2) **Murphy E**, Williams N, Bennett M, Jennings D, Chantrey J, McElhinney L (2019), Detection of Seoul virus in wild brown rats (Rattus norvegicus) from pig farms in Northern England. Vet Record; 184(17): 525

Dr Corinne Amar (AFC8) is the Section Head of the Foodborne Pathogens Reference Services within GBRU, UKHSA, since 2011. She has been developing her expertise in gastrointestinal pathogens since 2003 and particularly in Gram positive foodborne pathogens when she joined GBRU in 2007. She specialises in molecular detection and typing and participated in the development of WGS of *L. monocytogenes* for outbreak detection and investigation of *Listeria monocytogenes*.
Project Role: Listeria monocytogenes expert
Publications include:
1. McLauchlin J, Aird H, **Amar C**, Boyd G, Brindle A, Dallman T, Jalava K, Painset A, Simbo A, Swindlehurst M. Listeriosis associated with pre-prepared sandwich consumption in hospital in England, 2017. Epidemiol Infect. 2021 30(149):e220
2. McLauchlin J, Aird H, **Amar C**, Barker C, Dallman T, Elviss N, Jorgensen F, Willis C. *Listeria monocytogenes* in Cooked Chicken: Detection of an Outbreak in the UK (2016-2017) and Analysis of *L. monocytogenes* from Unrelated Monitoring of Foods (2013-2017) J Food Prot. 2020. doi: 10.4315/JFP-20-188
3. McLauchlin J, Grant KA, **Amar CFL**. Human foodborne listeriosis in England and Wales, 1981 to 2015. *Epidemiology and Infection*; 2020 148, e54, 1-14. doi.org/10.1017/S0950268820000473
4. Elson R, Awofisayo-Okuyelu A, Greener T, Swift C, Painset A, **Amar CFL**, Newton A, Aird H, Swindelhurst M, Elviss N, Foster K, Dallman TJ, Ruggles R, Grant K. Utility of Whole Genome Sequencing To Describe the Persistence and Evolution of *Listeria monocytogenes* Strains within Crabmeat Processing Environments Linked to Two Outbreaks of Listeriosis. Journal of Food Protection, 82,2019, p30–38

Dr Anaïs Painset (G7) is the Lead Bioinformatician of the gastrointestinal pathogens within GBRU, UKHSA. Joining PHE/UKSA in 2015, she was part of the implementation of the WGS pipelines for gastrointestinal pathogens. She has expertise in analysis of WGS data to support pathogen surveillance, inform during

outbreak investigation in association with phylogeny. Her interests are on phylogenomic and gene profiling (genotypic AMR, virulence).
Project Role: Responsible for delivering bioinformatic analysis required for *L. monocytogenes* SNP typing to ascertain any links to isolates from human cases.
Publications include:

1) **Painset, A**., Day, M., Doumith, M., Rigby, J., Jenkins, C., Grant, K., Dallman, T.J., Godbole, G., and Swift, C. (2020). Comparison of phenotypic and WGS-derived antimicrobial resistance profiles of Campylobacter jejuni and Campylobacter coli isolated from cases of diarrhoeal disease in England and Wales, 2015–16. J Antimicrob Chemother *75*, 883–889. 10.1093/jac/dkz539.
2) **Painset, A**., Björkman, J.T., Kiil, K., Guillier, L., Mariet, J.-F., Félix, B., Amar, C., Rotariu, O., Roussel, S., Perez-Reche, F., et al. (2019). LiSEQ – whole-genome sequencing of a cross-sectional survey of Listeria monocytogenes in ready-to-eat foods and human clinical cases in Europe. Microbial Genomics *5*. 10.1099/mgen.0.000257.
3) Dallman, T., Ashton, P., Schafer, U., Jironkin, **A., Painset**, A., Shaaban, S., Hartman, H., Myers, R., Underwood, A., Jenkins, C., et al. (2018). SnapperDB: a database solution for routine sequencing analysis of bacterial isolates. Bioinformatics *34*, 3028–3029. 10.1093/bioinformatics/bty212.
4) Ashton, P.M., Nair, S., Peters, T.M., Bale, J.A., Powell, D.G., **Painset, A**., Tewolde, R., Schaefer, U., Jenkins, C., Dallman, T.J., et al. (2016). Identification of Salmonella for public health surveillance using whole genome sequencing. PeerJ *4*, e1752. 10.7717/peerj.1752.

Participant Organisation 1	ANIMAL PLANT HEALTH AGENCY (APHA)

Named staff members, details of specialism and expertise.

Dr Catherine Fearnley (APHA Lead)
(Catherine Fearnley is supported by Dr. M Anjum).
Catherine Fearnley is a veterinary microbiologist with 20 years expertise in microbiological and molecular detection of zoonotic pathogens in food and other matrices. She has a PhD from the University of Birmingham and 10 years experience at APHA in test development, gaining extensive knowledge in the detection of pathogens using PCR. She has also developed expertise in AMR testing of *E. coli* and conducting MIC testing and an expert in the identification of bacteria using MALDI-ToF, She is project leader for the FSA survey FS430917 of AMR *E. coli*, *Campylobacter spp.* and *Salmonella spp.* in chicken and turkey meat on retail sale in the UK (2022) and has lead a previous FSA study testing retail beef and pork samples in 2021.
Project role: Responsible for APHA work including MIC testing and storage of *E. coli* isolates; reporting of MIC data; liaison between UKHSA and APHA.
Selected, recent publications:

1. Sources of *Campylobacter* colonisation in broiler chickens (2003). Newell DG and Fearnley C. Appl. Environ. Microbiol. 69 (8), 4343-4351.
2. Amplification of fluorescent amplified fragment length polymorphism for comparison of human and animal isolates of Yersinia enterocolitica (2005). Fearnley C, On, SLW, Kokotovik B, Manning G, Cheasty T, Newell DG, Appl. Environ. Mircobiol. 71 (9), 4960-4965.
3. Identification of hyperinvasive *Campylobacter jejuni* strains isolated from poultry and human clinical sources (2008), Fearnley C, Manning G, Bagnall M, Javed MA, Wassenaar TM, Newell DG. J Med. Microbiol. 57(5) 570-80.

Beaulieu Puddicombe
Beaulieu Puddicombe is a molecular biologist/microbiologist who graduated with a first-class honours degree in Biological Sciences from University of Roehampton in 2018. She has completed an MSc in Bioinformatics with a dissertation comparing *Klebsiella pneumoniae* from pigs to identify antimicrobial resistance and virulence genes. Beaulieu has worked at APHA for 6 years and has worked on several projects including AMR in *E. coli* in chicken and pigs, MIC testing of *Streptococcus, E. coli*, MRSA and *Campylobacter*. Beaulieu is currently laboratory manager for a small team responsible for surveillance of AMR *E. coli* from meat producing animals, and also for the FSA project on AMR *E. coli*, *Campylobacter spp.* and *Salmonella spp.* in chicken and turkey meat on retail sale in the UK in 2021-2022.
Project role: MIC testing and archiving of E. coli isolates; MIC data entry and interpretation of results

Participant Organisation 2	**Quadram Institute Bioscience (QIB)**

Named staff members, details of specialism and expertise.

Professor Alison Mather, Quadram Institute Bioscience (QIB) – L. monocytogenes WGS lead
Programme Leader of Microbes and Food Safety Institute Strategic Programme, QIB.
• 2007 MSc in Epidemiology (University of Guelph, Canada) and in 2011 PhD in Epidemiology (University of Glasgow)
Professor Alison Mather of Quadram Institute Bioscience (QIB) has many years of experience with microbial genomics data relevant to this project, as does the wider QIB environment that will be of benefit to the project. There is an established QIB Bioinformatics team who work to maintain and develop bioinformatics resources in

support of world leading food genomics research programmes. Professor Mather has worked in AMR research for >20 years, contributing to the development of bioinformatics software and tools to facilitate investigation of complex biological problems, and her research has provided novel insights into the contributions of different sources to the burden of AMR.
Selected projects funded in past 5 years (total > £3m funding as PI or CoI excluding Institute funding in last 5 years):

- 2022-2024 BBSRC BB/X012719/1: Canada IPAP: Evolutionary dynamics of antimicrobial resistance in human impacted soils: does the genie go back into the bottle?
- 2021-2023 HM Treasury: Environmental AMR surveillance – tackling antimicrobial resistance in and from the environment (subcontractor)
- 2020-2024 BBSRC: Canada Partnering Award: Development of Genomic Approaches to Antimicrobial Resistance in a One Health Framework
- BBSRC-FAPESP BB/S018913/1: Drivers and dynamics of antimicrobial resistance and *Salmonella* in Brazilian pig and poultry production
- 2019-2021 Medical Research Foundation Emerging Leader Prize in Antimicrobial Resistance (runner up):

2019-2020 Bill and Melinda Gates Foundation: Impact of Salmonella Typhi genome structure upon survival in water

- 2017-2022 Medical Research Council (MRC), Joint Programming Initiative on Antimicrobial Resistance (JPIAMR) MR/R000948/1: Genomic approach to transmission and compartmentalization of extended-spectrum cephalosporin resistance in Enterobacteriaceae from animals and humans.

Publications: > 75 peer reviewed publications; Google scholar h-index 38
https://scholar.google.com/citations?user=6oUf65UAAAAJ&hl=en
Relevant publications:
Janecko N, Zamudio R, Palau R, Bloomfield SJ, Mather AE. Repeated cross-sectional study identifies differing risk factors associated with microbial contamination in common food products in the United Kingdom. Food Microbiol. 2023; 111:104196. doi: 10.1016/j.fm.2022.104196.
Bloomfield SJ, Zomer AL, O'Grady J, Kay GL, Wain J, Janecko N, Palau R, Mather AE. Determination and quantification of microbial communities and antimicrobial resistance on food through host DNA-depleted metagenomics. Food Microbiol. 2023; 110:104162. doi: 10.1016/j.fm.2022.104162
Mellor KC, Petrovska L, Thomson NR, Harris K, Reid SWJ and Mather AE. (2019) Antimicrobial resistance diversity suggestive of distinct Salmonella Typhimurium sources or selective pressures in food-production animals. Front Microbiol. doi: 10.3389/fmicb.2019.00708.

Dr Matthew Gilmour (QIB Listeria lead)
Deputy Leader of the Microbes and Food Safety Institute Strategic Programme, QIB
Director, Food Safety Research Network, QIB, BBSRC, FSA

- 1999 BSc in Cell Biotechnology (University of Alberta) and 2004 PhD in Medical Microbiology and Immunology (University of Alberta; Governor General's Gold Medal)
- 2014 Fellow of the Canadian College of Microbiologists; 2022 Fellow of the Institute of Food Science & Technology

Dr Matthew Gilmour leads the '*Listeria* and other Invasive Pathogens' research group at the Quadram Institute and has significant research and leadership experiences that will directly benefit this project. Matthew was previously based in Canada where his group was a pioneer in using bacterial genomics to study outbreaks, including the national Canadian listeriosis outbreak in 2008 and then the Haitian cholera outbreak of 2010. With this experience in public health, from 2015 to 2020 Matthew was the Scientific Director General of Canada's National Microbiology Laboratory. Matthew is also now Director of the Food Safety Research Network, based at the Quadram Institute. This network has the goal of brokering collaborative research projects between food businesses and academic research groups that will make UK foods safer from microbial risks.

Selected projects funded in the past 5 years (total >£2M as PI or CoI excluding Institute funding)

- 2022-2024 Formation of a UK Food Safety Research Network. Biotechnology and Biosciences Research Council (BBSRC) and Food Standards Agency (FSA).
- 2021-2025 BBSRC Canada Partnering Award – Advancement of Genomic Tools to Study the Foodborne Transmission of *Listeria monocytogenes*
- 2021-2025 Supervisor of Doctoral Training Programme – Understanding how *Listeria* survive in the food factory – FSA and Norwich Research Park
- 2023-2027 Supervisor of Doctoral Training Programme – Pathogens and Probiotics: A Tug of War – Norwich Research Park
- 2021-2023 – Barts Charity – Nanopore Metagenomics: Impact on a large endocarditis population
- 2021-2022 – Innovate UK - Development of key technologies for real-time diagnosis, surveillance and intervention of resistant-bacterial infections based on nanopore sequencing

Relevant publications:

1. Reimer A, Weedmark K, Petkau A, Peterson CL, Walker M, Knox N, Kent H, Mabon P, Berry C, Tyler S, Tschetter L, Jerome M, Allen V, Hoang L, Bekal S, Clark C, Nadon C, Van Domselaar G, Pagotto F, Graham M, Farber J, and Gilmour M. Shared genome analyses of notable listeriosis outbreaks, highlighting the critical importance of epidemiological evidence, input datasets and interpretation criteria. *Microbial Genomics*. 2019 Jan;5(1). doi.org/10.1099/mgen.0.000237
2. Gilmour MW, Graham M, Van Domselaar G, Tyler S, Kent H, Trout-Yakel K, Larios O, Allen V, Lee B, Nadon C. High-Throughput Genome Sequencing of Two *Listeria monocytogenes* Clinical Isolates During a Large Foodborne Outbreak. *BMC Genomics*. 11:120. (granted permanent status as a '**Highly Accessed Article'**). doi.org/10.1186/1471-2164-11-120
3. Kovacevic J, Ziegler J, Wałecka-Zacharska E, Reimer A, Kitts DD, Gilmour MW. Tolerance of *Listeria monocytogenes* to Quaternary Ammonium Sanitizers Is Mediated by a Novel Efflux Pump Encoded by *emrE*. Appl Environ Microbiol. 2015;82:939-53. doi: 10.1128/AEM.03741-15.
4. Kovacevic J, Sagert J, Wozniak A, Gilmour MW, Allen KJ. Antimicrobial resistance and co-selection phenomenon in *Listeria* spp. recovered from food and food production environments. Food Microbiol. 2013; 34:319-27. doi: 10.1016/j.fm.2013.01.002.

Doctor Samuel Bloomfield (QIB)

Doctor Samuel Bloomfield is a post-doctoral scientist working at the QIB with >10 years of experience working with bacteria and antimicrobial resistance. His research focuses on using genomics and metagenomics to investigate bacteria from food and clinical samples, antimicrobial resistance, how bacterial populations change over time and how bacteria are transmitted between different environments.

Education

- 2013: BSc Microbiology (Honours) in Microbiology (Massey University)
- 2014-2017: PhD in Microbiology and Genetics (Massey University)

Positions:

- 2018-Present: Postdoctoral Research Scientist, Quadram Institute Bioscience, Norwich, United Kingdom
- 2012-2013: Medical Laboratory Scientist, Wellington Hospital, New Zealand

Publications: 18 peer-reviewed publications; Google scholar h-index 7: https://scholar.google.com/citations?user=rjr_RSEAAAAJ&hl=en.

Relevant publications:

1. Bloomfield, S.J., Janecko, N., Palau, R., Alikhan, N.-F., Mather, A.E., 2023. Genomic diversity and epidemiological significance of non-typhoidal Salmonella found in retail food collected in Norfolk, UK. Microbial Genomics 9, 1–12. https://doi.org/https://doi.org/10.1099/mgen.0.001075
2. Janecko N., Zamudio R., Palau R., Bloomfield S.J., Mather A.E., 2023. Repeated cross-sectional study identifies differing risk factors associated with microbial contamination in common food products in the United Kingdom. Food Microbiology 111 (104196):1–12. Available from: https://doi.org/10.1016/j.fm.2022.104196
3. Djeghout, B., Bloomfield, S.J., Rudder, S., Elumogo, N., Mather, A.E., Wain, J., Janecko, N., 2022. Comparative genomics of Campylobacter jejuni from clinical campylobacteriosis stool specimens. Gut Pathogens 14: 1–13. https://doi.org/10.1186/s13099-022-00520-1
4. Bloomfield, S., Duong, V.T., Tuyen, H.T., Campbell, J.I., Thomson, N.R., Parkhill, J., Le Phuc, H., Chau, T.T.H., Maskell, D.J., Perron, G.G., Ngoc, N.M., Vi, L.L., Adriaenssens, E.M., Baker, S., Mather, A.E., 2022. Mobility of antimicrobial resistance across serovars and disease presentations in non-typhoidal Salmonella from animals and humans in Vietnam. Microbial Genomics 8, 1–13. https://doi.org/https://doi.org/10.1099/mgen.0.000798

Participant Organisation 3	AFBI NORTHERN IRELAND

Named staff members, details of specialism and expertise.

AFBI NI have provided primary detection and MIC testing in current and previous projects (e.g. FS900253, S102121) and are very familiar with detection of *L. monocytogenes* and *E. coli* from samples.

Dr. Nicolae Corcionivoschi will lead the primary testing of samples at AFBI NI ensuring we capture products sold (and probably produced) in NI. UKAS accredited MIC testing of Listeria isolates will be led by Dr **Catherine Couzens** who has recently been involved in undertaking MIC testing.

Dr Nicolae Corcionivoschi: AFBI NI laboratory lead

Dr Corcionivoschi will be responsible for the work delivered by the AFBI NI and in particular lead the primary testing of samples in this lab

Catherine Couzens will be responsible for undertaking MIC testing/interpretation/reporting and archiving of *L. monocytogenes* isolates. She has postgraduate training and is the deputy technical manager of the veterinary AMR laboratory in Northern Ireland.

Publications include:

1. Chifiriuc MC, Filip R, Constantin M, Pircalabioru GG, Bleotu C, Burlibasa L, Ionica E, **Corcionivoschi N**, Mihaescu G. Common themes in antimicrobial and anticancer drug resistance. Front Microbiol. (2022) 13:960693. doi: 10.3389/fmicb.2022.960693
2. O'Hagan MJH, Pascual-Linaza AV, **Couzens C,** Holmes C, Bell C, Spence N, Huey RJ, Murphy JA, Devaney R**,** Lahuerta-Marin A. Estimation of the Prevalence of Antimicrobial Resistance in Badgers (Meles meles) and Foxes (Vulpes vulpes) in Northern Ireland. Front Microbiol. 2021. 12:596891. doi: 10.3389/fmicb.2021.596891.
3. McMurray RL, Ball MEE, Tunney MM, **Corcionivoschi N**, Situ C. Antibacterial Activity of Four Plant Extracts Extracted from Traditional Chinese Medicinal Plants against Listeria monocytogenes, Escherichia coli, and Salmonella enterica subsp. enterica serovar Enteritidis. Microorganisms. 2020; 8:962. doi: 10.3390/microorganisms8060962

C. STAFF EFFORT

In the table below, please detail the staff time to be spent on the project (for every person named in section above) and their role in delivering the proposal. If new staff will be hired in order to deliver the project please include their grade, name and the staff effort required.

Name and Role of Person where known/ Role of person to be recruited	Working hours per staff member on this project
Dr Caroline Willis – project lead (UKHSA)	75 h
Dr Frieda Jorgensen – project manager (UKHSA)	37.5 h
Dr Kartyk Moganeradj – lead-liaison with WGS-derived data link up (UKHSA)	45 h
Dr Paz Aranega Bou – liaison with APHA – phenotypic AMR data (UKHSA)	45 h
Dr Ellen Murphy – liaison with sampling and FWEMS labs (UKHSA)	45 h
Dr Anais Painset (SNP analysis lead (to establish link with human cases) UKHSA bioinformatics	37.5 h
Dr Corinne Amar – Listeria monocytogenes expert (UKHSA)	15 h
Dr. Catherine Fearnley – lead for APHA work	45 h
Beaulieu Puddicombe – APHA E. coli MIC practical lead	30 h
Prof. Nicolae Corcionivoschi AFBI NI primary testing lead	7.5 h
Catherine Couzens AFBI NI *L. monocytogenes* MIC lead	7.5 h
Prof A. Mather - Listeria monocytogenes WGS lead	60 h
Prof. M. Gilmour - Listeria monocytogenes genetics/phenotype lead	20.5 h
Dr. S. Bloomfield - WGS work	75 h
Total staff effort	

5: PROJECT MANAGEMENT

Please fully describe how the project will be managed to ensure that objectives and deliverables will be achieved on time and on budget. Please describe how different organisations/staff will interact to deliver the desired outcomes.
Highlight any in-house or external accreditation for the project management system and how this relates to this project.

Project Management

There is a formal project management process at UKHSA, which covers all stages of the project. All external transactions (to UKHSA) involving transfer of funding, proprietary information or materials must be covered by a legally-binding contract. Once negotiated, agreed and signed, a copy of the contract is handed to the project manager, where they take responsibility for the running of the project, including reporting and audit requirements. The financial management of the project is underpinned by the electronic ledger system of UKHSA, where a unique code is created to ensure auditing and budget management. A dedicated member from the Finance Department sets up the project according to the activities outlined in the financial proposal and periodically reviews the project to ensure project costs reflect income.

A project initiation meeting should be held in January 2024 (tbc depending on date contracts are signed) followed by a series of project review meetings to be held via Teams every quarter and ad-hoc as required.
We suggest an agenda for these meetings to capture review of samples collected, sample numbers tested against expected numbers, review of test outcomes and any adjustment necessary e.g. if fewer or more samples than anticipated test positive for any of the pathogens; review sample details captured and any re-sampling necessary; review of typing results and any possible links to human cases; review of progress with MIC testing; discuss presentations and submission of interim reports; review of invoicing scheduled.

We will also hold internal monthly project meetings to review progress with testing – meetings would be attended by all the primary testing laboratories as well as laboratories undertaking the MIC testing to ensure isolates are received as planned. We will download results promptly at least monthly to review records of test results are satisfactory. Based on previous experience the project team will be communicating by email and/or phone at least weekly – especially in the initial phase to ensure all sample receipt and testing procedures are being completed as per our protocol.

The nominated FSA Project Officer (Wioleta Trzaska) will receive a short email update around 27th of each month from the Principle Investigator, Caroline Willis. These monthly updates should consist of a few lines on whether the project is running to schedule and any risk/issues which could potentially impact the delivery of the project. This information is important as it is used as evidence by the FSA Project Officer to fulfil their own monthly project finance reporting to the FSA's Finance Department and to track that the project is running according to schedule and the funds will be released as expected.

Please note that UKHSA will only submit an invoice for completed deliverables once they have received authorisation from the nominated FSA Project Officer.

People
Caroline Willis (the lead applicant) has worked in UKHSA (and previously PHE, HPA and PHLS) for 26 years and has experience in project management and successful delivery of externally funded projects. She has experience of leadership and co-ordination of projects and delivering the service outcome sought. The project will benefit from existing strong relationships with sample contractors and within UKHSA laboratories as well as external laboratories.

Project completion
Completion of the project will include the completion of all deliverables signed off by the funder as well as a final project report. This will require that the final technical report has been accepted by the FSA following a peer-review process (at which point the retention payment will be released).

Accreditation
The UKHSA applies a total Quality Management system to all laboratory activities which is designed to meet the general requirements of all the relevant standards which is equivalent to BS EN ISO9000. Accreditation is held across the organisation with relevant bodies to ensure compliance. Due to the range of activities undertaken by the UKHSA a range of accreditation is held with a range of bodies, including against ISO 17025 through United Kingdom Accreditation Service (UKAS).

6. RISK MANAGEMENT

In the table provided, please identify all relevant risks in delivering this project on time and to budget. Briefly outline what steps will be taken to minimise these risks and how they will be managed by the project team. Please add more lines as required

Identified risk	Likelihood of risk (high, medium, low)	Impact of Risk (high, medium, low)	Risk management strategy
Loss of laboratory facilities	Low	High	Invoke UKHSA Business Continuity Plans and transfer work to alternative

			UKHSA FW&E and/or AFBI /APHA laboratory sites
Non-compliant EQA or IQA results for test method	Low	Medium	The laboratory involved will repeat the EQA or IQA test. Local Quality System processes will be undertaken to determine the root-cause of the problem.
Staff time not available due to public health emergency (e.g. major foodborne outbreaks)	Low	Medium – High	Cover activity with existing available staff and invoke UKHSA Business Continuity Plans. Three FW&E labs able to cover for each other where necessary.
Senior staff not available due to sickness	Medium	Low	Cover to be provided by one or more of the three post-doctoral scientists available within the FW&E team, to ensure that project management and communications continue according to project plan.
Loss of laboratory reception facilities	Low	High	Invoke UKHSA Business Continuity Plans and transfer reception to alternative UKHSA FW&E sites
Failure of media suppliers to deliver required test media	Low	High	Use of alternative suppliers / transfer of supplies between laboratories
Risk if sampling contractor unable to provide the salmon samples	Low	Medium	Discuss with the project management team whether UKHSA staff could assist with obtaining samples
Risk of financial/budget deviations	High	Low	The costs may be lower or higher than projected if fewer or more isolates, respectively, are available for MIC/WGS testing – the project management team should decide how to manage this e.g. reduce the number of isolates to be MIC tested or increase sample numbers.

7. QUALITY MANAGEMENT

A. QUALITY MANAGEMENT

Please provide details of the measures that will be taken to manage and assure the quality of work. You should upload your Quality Assurance policy in the supporting documents section of your application.

This should include information on the quality assurance (QA) systems, which have been implemented or are planned, and should be appropriate to the work concerned. All QA systems and procedures should be clear and auditable and may include compliance with internationally accepted quality standards specified in the ITT e.g., ISO 9001 and ISO17025.

Specific to science projects and where relevant, applicants must indicate whether they would comply with the Joint Code of Practice for Research (JCoPR). If applicants do not already fully comply with the JCoPR please provide a statement to this effect to provide an explanation of how these requirements will be met. The FSA reserves the right to audit projects against the code and other quality standards

The lead principle investigator is responsible for all work carried out in the project; (including work supplied by sub-contractors) and should therefore ensure that the project is carried out in accordance with the Joint Code of Practice

UKHSA Quality Assurance

UKHSA applies a total Quality Management system to all laboratory activities which is designed to meet the general requirements of the relevant standards ISO 17025 and ISO 15189 and covers the requirement for quality and competence in laboratories. Accreditation is held across the organisation with relevant bodies to ensure compliance. Due to the range of activities undertaken by the UKHSA accreditation is held with a range of bodies. The UKHSA FW&E laboratories are designated Official Laboratories and are accredited to the ISO 17025 standard for a range of procedures (including Listeria and E. coli methods). Microbiological testing performed in the laboratories is audited by UK Accreditation Service (UKAS) annually to ensure compliance with the Standard (General Requirements for the Competence of testing and Calibration laboratories; ISO/IEC 17025:2017). The UKHSA Bacteriology Reference Unit in Colindale holds UKAS accreditation against the International Standard 'Medical laboratories -- Particular requirements for quality and competence' (ISO 15189:2007). This standard specifies requirements for quality and competence particular to medical laboratories and is for use by medical laboratories in developing their quality management systems and assessing their own competence, and for use by accreditation bodies in confirming or recognising the competence of medical laboratories. Laboratory protocols, laboratory equipment and results are subject to documented quality control procedures internally and externally. Details of such procedures will be made known to the FSA and be available for audit by the FSA on request. All other aspects of the work will be available for audit by the FSA (or a nominated representative). All work will comply with the Joint Code of Practice for Research.

APHA Quality Assurance

The APHA aims to maintain a high standard of quality in all aspects of its operation and to continually satisfy our customers in respect of all the services and products offered. The laboratory facilities are UKAS accredited to ISO 17025:2017 standard for an extensive range of tests supported by proficiency testing. The testing APHA is responsible for within this document has been validated to the same standard as required for ISO 17025 accreditation and involve staff, facilities and equipment accredited for ISO 17025 work. APHA is also certificated to ISO 9001:2015 by Bureau Veritas (UK) Quality Assurance for 'the provision of a range of specialist veterinary scientific services and products to the Government and other interested parties worldwide. APHA also complies with Joint Code of Practice for Research. The code applies to all research funded by Defra, the FSA and the UK devolved administrations and to research funded by BBSRC and NERC in their own institutes.

AFBINI Quality Assurance

The AFBINI Food Microbiology Laboratory has held accreditation as an ISO 17025 testing

B. ETHICS

Please identify the key ethical issues for this project and how these will be managed. Please respond to any issues raised in the Specification document
Please describe the ethical issues of any involvement of people, human samples, animal research or personal data in this part. In addition, please describe the ethical review and governance arrangements that would apply to the work done.

Applicants are reminded that, where appropriate, the need to obtain clearance for the proposed project from their local ethics committee. This is the responsibility of the project Lead Applicant. However, if a sub-contractor requires such clearance the project Lead Applicant should ensure that all relevant procedures have been followed. If there are no ethical issues please state this

No formal ethics approval is required as this study will not involve people, human samples, animal research or personal data. All UKHSA, AFBI and APHA staff with access to sensitive commercial data in the study are aware of confidentiality as part of their professional duties and this shall be governed by the relevant contracts, should UKHSA be successful.

C. DATA PROTECTION

Please identify any specific data protection issues for this project and how these will be managed. Please respond to any specific issues raised in the Specification document.
Please note that the successful Applicant will be expected to comply with the Data Protection Act (DPA) 1998 and ensure that any information collected, processed and transferred on behalf of the FSA, will be held and transferred securely.

In this part please provide details of the practices and systems which are in place for handling data securely including transmission between the field and head office and then to the FSA. Plans for how data will be deposited (i.e. within a community or institutional database/archive) and/or procedures for the destruction of physical and system data should also be included in this part (this is particularly relevant for survey data and personal data collected from clinical research trials). The project Lead Applicant will be responsible for ensuring that they and any sub-contractor who processes or handles information on behalf of the FSA are conducted securely.

UKHSA is committed to achieving a high standard of performance against the Cabinet Office's information standards. No Personal Confidential Data is envisaged to be handled in this project; however, advice can be sought from the UKHSA Caldicott Guardian where needed.

All staff are mandated to complete and pass, on an annual basis, defined minimum information governance training as detailed in the UKHSA Mandatory Training Schedule. All staff must mark documents and correspondence in accordance with the Government Security Classification scheme and supporting guidance. UKHSA will comply with relevant data protection legislation and this will be covered in the agreement between the FSA and UKHSA, should UKHSA be successful.

UKHSA recognises that a key aspect of the project is dissemination of results, as defined in one of the project objectives above.
All data (including laboratory performance data) will be treated as confidential and will not be released without written permission from the FSA

D. SUSTAINABILITY

The Food Standards Agency is committed to improving sustainability in the management of operations. Procurement looks to its suppliers to help achieve this goal. You will need to demonstrate your approach to sustainability, in particular how you will apply it to this project taking into account economic, environmental and social aspects. This will be considered as part of our selection process and you must upload your organisations sustainability policies into the eligibility criteria in Bravo.
Please state what(if any) environmental certification you hold or briefly describe your current Environmental Management System (EMS)

UKHSA is committed to protecting the environment and reducing carbon emissions arising from its activities. To do this it has developed a carbon reduction delivery plan, as part of its overall carbon management programme. UKHSA policy has been developed to help staff to consider their impact on the environment for example when travelling, purchasing goods and using energy. Where staff are working on sites that are not managed by UKHSA, there is encouragement to contribute to the sites owners efforts to minimise their own carbon footprint. The UKHSA has developed Environmental Sustainability Policy documents that minimise the impact on the environment. These include an overall Environmental Sustainability Policy as well as policies for Procurement, Travel and Catering. All UKHSA staff participate in Environmental Sustainability training as part of their portfolio of mandatory training.

E. DISSEMINATION AND EXPLOITATION (Science Projects Only)

Where applicable please indicate how you intend to disseminate the results of this project, including written and verbal communication routes if appropriate. Applicants are advised to think carefully about how their research aligns with the FSA strategy, what is the impact that their research has on public health/ consumers and decide how the results can best be communicated to the relevant and appropriate people and organisations in as cost-effective manner as possible. Please provide as much detail as possible on what will be delivered. Any costs associated with this must be documented in the Financial Template.

The applicant should describe plans for the dissemination of the results for the project team as a whole and for individual participants. Details should include anticipated numbers of publications in refereed journals, articles in trade journals etc., presentations or demonstrations to the scientific community, trade organisations and internal reports or publications. Plans to make any information and/or reports available on the internet with the FSA's permission are also useful, however, this does not remove the requirement for Tenderers to think how best to target the output to relevant groups.
If a final report is part of the requirement, please make sure, as part of the executive summary, that aims and results are clear to the general audience and that the impact of the research on public health/consumers and it's alignment to FSA priorities is clearly stated.

Please note that permission to publish or to present findings from work supported by the FSA must be sought in advance from the relevant FSA Project Officer. The financial support of the FSA must also be acknowledged.

Please indicate whether any Intellectual Property (IP) may be generated by this project and how this could be exploited. Please be aware the FSA retains all rights to the intellectual property generated by any contract and where appropriate may exploit the IP generated for the benefit of public health.
In this part Applicants should demonstrate the credibility of the partnership for exploitation of the results and explain the partnership's policy in respect of securing patents or granting licenses for the technology (if applicable). It should deal with any possible agreements between the partners to extend their co-operation in the exploitation phase and with relevant agreements with companies, in particular users, external to the partnership

For communication and dissemination of information, UKHSA will:

- Prepare sample test reports (isolation of target bacteria from samples)
- Prepare MIC report with confirmed presence of any genetic AMR determinants
- Prepare a final project report addressing the relevant areas of the survey in a suitable and accessible format for publication on the FSA website. The report will include a lay summary, executive summary, introduction, methodology, results, discussions, conclusions, references and recommendations for further work. Any brand will be anonymised. Raw data from the testing will be provided in both a non-anonymised (for FSA's use) and an anonymised version that would allow access by others.
- Notify the FSA immediately by email or telephone of any deviations which may affect the specifications and timing of the work programme.
- Notify the FSA immediately of any unusual occurrences resulting from any of the functions of the project.
- Not communicate to any external parties without the written permission of the FSA representative results or reports arising from the work
- Not use data for presentations and/ or papers unless written permission has been sought and given by the FSA
- Maintain records for a period of 3 years from the end of the contract.
- Ensure all communications relating to the project work will be conducted through the FSA's representative
- Make available a suitably qualified contact person or system at the laboratory to answer telephone or email queries from the FSA.
- Present at meetings as required to FSA and other stakeholders e.g. ACMSF, VMD, FSS
- Consider together with the FSA dissemination of results and possible use of results for information leaflets etc. that can help mitigate any risks associated with raw and cold smoked salmon for consumers.
- Submit a manuscript to a peer-reviewed journal describing the results.

It is not expected that any foreground intellectual property that will be generated by this project will be commercially exploitable; however the results and reports will be widely disseminated, following approval from the FSA, to maximise research impact and benefit to public health.

8. SOCIAL VALUE

Social value has a lasting impact on individuals, communities and the environment. Government has a huge opportunity and responsibility to maximise benefits effectively and comprehensively through its commercial activity. To be effective it is essential that the FSA consider social value at all stages of the procurement life cycle. In order to do this, we are applying the Government Commercial Functions social value model PPN 06/20 Procurement Policy Note - Taking account of social value in the award of government contracts. The Social Value Quick Reference Table provides a useful summary of the criteria and the reporting metrics for each of the criteria, including examples.

In order to evaluate this, we ask that you answer the following:

A. WELLBEING: IMPROVING HEALTH AND WELLBEING:

Using a maximum of 3000 characters describe the commitment your organisation will make to ensure that opportunities under the contract deliver the Policy Outcome and Model Award Criteria 7.1: 'Demonstrate action to support health and wellbeing, including physical and mental health, in the contract workforce'.

Please include:

● your 'Method Statement', stating how you will achieve this and how your commitment meets the Award Criteria, and
● a timed project plan and process, including how you will implement your commitment and by when. Also, how you will monitor, measure and report on your commitments/the impact of your proposals. You should include but not be limited to:
○ timed action plan
○ use of metrics
○ tools/processes used to gather data
○ reporting
○ feedback and improvement
○ transparency

The UKHSA are making comprehensive commitments to supporting the social value model with the following initiatives:

Commercial
UKHSA commercial policy complies with central government legislation and policy initiatives around social and environmental values. This includes the government's procurement policy notes on social value and carbon emissions, and the public sector equality duty. We area also currently developing our commercial and contract management processes to give further assurance on implementation.
UKHSA has published its environmental policy statement which includes roles and responsibilities and training and has appointed a Head of Sustainable Development and Environmental Management.

Recruitment
UKHSA follows the principles of the civil service recruitment policy so that people are appointed to roles on merit via a fair and open competition.

Staff wellbeing
UKHSA has developed staff wellbeing policies, with a range of initiatives available to staff to support physical and mental wellbeing.

UKHSA's values
Being inclusive is one of the key UKHSA values, ensuring that every single person in our organisation is valued and a range of voices are listened to. UKHSA works in partnership to make decisions – with our people, with partners, across communities.

Staff networks
UKHSA has a number of staff networks which support employees e.g. employees with different need or faiths.

ADDITIONAL SUPPORTING DOCUMENTS

Please note that any additional documents in support of the on-line application, as well as the Gant/PERT charts requested for the Project Plan section, should be zipped into a single file (using WinZip). These should then be uploaded to the e-sourcing portal, Bravo in to the *Supporting Documents* section of the technical envelope. Each supporting document should be clearly marked with the following details:

- the tender reference number,
- the tender title,
- the name of the lead applicant submitting the proposal and
- the part number and title to which the supporting evidence appertains (e.g., Part 3 Deliverables)

Annex B – Financial Proposal

Tender Reference	FS900350 - C210688

Tender Title	A survey of AMR E. coli and Listeria spp. on raw, prepacked, farmed salmon fillets on retail sale in the UK (Lot 2)

Full legal organisation name	UK HEALTH SECURITY AGENCY

Main contact title	DR
Main contact forname	CAROLINE
Main contact surname	WILLIS

Main contact position	Head of the UKHSA FWEMS Porton laboratory
Main contact email	Caroline.willis@ukhsa.gov.uk
Main contact phone	01980 616775

Will you charge the Agency VAT on this proposal?	Yes

Please state your VAT registration number:	GB888851648

Project Costs Summary Breakdown by Participating Organisations
Please include only the cost to the FSA.

Organisation	VAT Code*	Total (£)
UKHSA	STD	
Insert name of Organisation 2	Please select	£ -
Insert name of Organisation 3	Please select	£ -

Insert name of Organisation 4	Please select	£ -
Insert name of Organisation 5	Please select	£ -
		£ -
		£ -
		£ -

Total Project Costs (excluding VAT) **	**£ -**

* Please indicate zero, exempt or standard rate. VAT charges not identified above will not be paid by the FSA
** The total cost figure should be the same as the total cost shown in table 4
** The total cost figure should be the same as the total cost shown below and in the Schedule of payments tab.

Project Costs Summary (*Automatically calculated*)

Staff Costs (UKHSA)	**£ 16,476.50**
Overhead Costs (UKHSA)	**£ 9,226.80**
Consumables and Other Costs	**£ 3,350.00**
Travel and Subsistence Costs	**£ 200.00**
Other Costs - Part 1	**£ 6,191.00**
Other Costs - Part 2	**£ 18,886.00**
Other Costs - Part 3	**£ 7,427.00**
Other Costs - Part 4	**£ 21,199.00**

Other Costs - Part 5	**£ 17,558.00**

Total Project Costs	**£ 100,514.30**

Staff Costs Table

*This should reflect details entered in your technical application section 4C.

Please insert as many lines as necessary for the individuals in the project team.

Please note that FSA is willing to accept pay rates based upon average pay costs. You will need to indicate where these have been used.

* Role or Position within the project	Participating Organisation	Daily Rate (£/Day)	* Daily Overhead Rate (£/Day)	Days to be spent on the project by all staff at this grade	**Total Cost (incl. overheads)**
Principal Investigator	UKHSA	£ 479.70		10	**£ 4,797.00**
Project manager	UKHSA	£ 405.40		5	**£ 2,027.00**

Lead for linking WGS data to samples	UKHSA	£384.17		6	£2,305.00
Lead for APHA liason/phenotypic AMR data sample linking	UKHSA	£384.17		6	£2,305.00
Lead for sampler liason for all primary testing labs	UKHSA	£384.17		6	£2,305.00
SNP analysis/bioinformatics lead	UKHSA	£385.50		5	£1,927.50
Listeria monocytogenes expert	UKHSA	£405.00		2	£810.00
Lead for APHA work (staff cost details in 'other costs')	APHA			6	£-
E. coli MIC/PCR practical lead, Beaulieu Puddicombe (staff cost details in 'other costs')	APHA			4	£-
AFBI NI sample testing lead (staff cost details in 'other costs')	AFBI NI			1	£-
L. monocytogenes MIC lead (staff cost details in 'other costs')	AFBI NI			1	£-
L. monocytogenes WGS lead	QIB			8	£-
L. monocytogenes WGS analysis	QIB			10	£-
L. monocytogenes predicted phenotype from genetics lead	QIB			2.75	£-
			Total Labour Costs		**£16,476.50**
			* Total Overhead Costs (if not shown above)		£9,226.80

***Please provide full details below of how you have calculated your total overhead costs**

Total Overhead Costs (shown as single value on Staff Costs Sheet), are expressed as 56% of UKHSA Staff Costs, which is a calculated apportionment of UKHSA Indirect Costs to the FWEMS Department
Please see "other costs" for details of staff costs for APHA, AFBI and QIB

Consumable/Equipment Costs

Please provide a breakdown of the consumables/equipment items you expect to consume during the project

Item	Quantity	Cost/Item(£)	Total
Publication fee in open access journal	1	£ 3,350.00	£ 3,350.00
		Total Material Costs	£ 3,350.00

Please provide, in the table below, estimates of other costs that do not fit within any other cost headings

Description and justification of the cost	Estimated Cost	
AFBI NI test and staff costs incl. overheads	£ 6,191.00	AFBINI costs (enumeration&detection of L. monocytogenes, detection of E. coli with phenotypic resistance to cefotaxime, carbapenems and/or colistin and enumeration of generic E. coli for 30 samples; staff time for reporting and write-up; MIC of L. monocytogenes (20) isolates (@£111 each))
APHA MIC testing and PCR of *mcr* genes	£ 18,886.00	MIC testing of presumptive ESBL/AmpC/ColR (w mcrPCR)/CarbR E.coli (15) and generic E. coli (150); storage of 165 isolates on beads (for 5 years); provision of QC-controilled specialist media (£1559)

APHA staff costs (includes APHA staff cost overheads)	£ 7,427.00	APHA staff costs incl. APHA overheads for APHA project management, result reporting and report writing
UKHSA FWEMS test cost	£ 21,199.00	UKHSA FWEMS cost for testing samples (270) including enumeration&detection of L. monocytogenes, detection of E. coli with phenotypic resistance to cefotaxime, carbapenems and/or colistin and enumeration of generic E. coli
QIB L. monocytogenes WGS and derived phenotypes	£ 17,558.00	Lead for L. monocytogenes WGS (Prof A. Mather - 8 days - £7968); WGS work (Dr. S. Bloomfield - 10 days £5900); L. monocytogenes expertise for genetic phenotype determinants (Prof. M. Gilmour 2.75 days £2690); WGS consumables £1000
Total Other Costs	**£ 71,261.00**	

Travel and Subsistence Costs

Please provide a breakdown of the travel and subsistence costs you expect to incur during the project

Purpose of journey or description of subsistence cost	Frequency	Cost each (£)	Total Cost
Project meeting travel to London	2	£ 100.00	£ 200.00

Total Travel and Subsistence Costs	**£ 200.00**

The Pricing Schedule

Please complete a proposed schedule of payments below, **excluding VAT** to be charged by any subcontractors to the project lead applicant. This must add up to the same value as detailed in the Summary of project costs to FSA including participating organisations costs.

Where differing rates of VAT apply against the deliverables please provide details on separate lines.
Please link all deliverables (singly or grouped) to each payment. Please ensure that deliverable numbers are given as well as a brief description e.g. Deliverable 01/02: interim report submitted to the FSA, monthly report, interim report, final report
Payment will be made to the Contractor, as per the schedule of payments upon satisfactory completion of the deliverables.

Proposed Project Start Date	**15-Jan-2024**	**Amount**		**§ Duration from start of project (Weeks)**	**§ Duration from start of project (Date)**	**Financial Year**
Invoice Due Date	**Description as to which deliverables this invoice will refer to (*Please include the deliverable ref no(s) as appropriate*)**	***Net**	****VAT Code**			
31-Jan-2024	D1: Sampling strategy and testing protocol agreed with the FSA	£ 10,083.00	STD	**2**	**31-Jan-2024**	**2023-24**
31-Jul-2024	D2: Data report 1 for confirmed detection of Listeria and E. coli	£ 17,388.00	STD	**28**	**31-Jul-2024**	**2024-25**

31-Jan-2025	D3: Data report 2 for confirmed detection of Listeria and E. coli	£ 17,388.00	STD	**55**	**31-Jan-2025**	**2024-25**
30-Apr-2025	D4: Data report 3 - completed detections of L. monocytogenes and E. coli data; MIC and WGS data.	£ 17,388.00	STD	**67**	**30-Apr-2025**	**2025-26**
15-May-2025	D5: Submission of final technical report	£ 11,164.44	STD	**69**	**15-May-2025**	**2025-26**
30-Jun-2025	D6: Final report accepted	£ 7,000.00	STD	**76**	**30-Jun-2025**	**2025-26**
Retention/Final Deliverable	***	**£ 20,102.86**				

Total	**£ 100,514.30**

* Please insert the amount to be invoiced net of any VAT for each deliverable
** Please insert the applicable rate of VAT for each deliverable
*** 20% of the total project budget is withheld and will be paid upon acceptance of a satisfactory final report by the agency.
§The number of weeks after project commencement for the deliverable to be completed

Summary of Payments

	Year 1	Year 2	Year 3	Year 4		
Financial Year (Update as applicable in YYYY-YY format)	**2023-24**	**2024-25**	**2025-26**	**2026-27**	Retention	Total
Total Amount	**£ 10,083.00**	**£ 34,776.00**	**£ 35,552.44**	**£ -**	**£ 20,102.86**	**£ 100,514.30**