PATH-SAFE Newsletter

January 2023

Hello! Welcome to issue 3 of the PATH-SAFE newsletter

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Key updates

Evaluation – we are very pleased to confirm that RAND Europe will be our supplier for the PATH-SAFE evaluation. Our Theory of Change, M&E Framework and Impact/Process Evaluation plans will be published in April.

AMR studies – a series of AMR Surveillance R&D projects are now underway following significant development activities in 2022. These include projects that are working to understand AMR trends in livestock, raw meat, milk, wastewater and imported animal feed ingredients/finished feed.

Queen's University of Belfast have joined the programme, in association with a number of Northern Ireland government departments (DoH, DAERA and DoI) and Northern Ireland Water Ltd. The project aims to explore the use of wastewater based epidemiology as a tool for detecting and monitoring Norovirus and antimicrobial resistance within care homes.

Communities of interest – following a very successful inaugural Wastewater for FBD and AMR Surveillance (WaFAS) Community of Interest (CoI) meeting in October 2022, the group will be meeting bi-monthly going forward. Plans are also underway to initiate two further groups, one for laboratory teams and one for analysis and bioinformatics.

✎ Workstream Updates

Great progress is being made across the programme. Below are some brief updates but for more detail on each workstream please see [our website](#).

WS1 – National foodborne disease genomic data platform

WS1a Update: Discovery, which will be used to tailor the development to end user needs, is complete. A summary of the findings will be shared with programme stakeholders in due course. A consortium approach to the delivery of the data platform will be taken. Contracting with consortium partners is in progress. Delivery is set to begin in February 2023.

WS1b Update: More samples are being sent for whole genome sequencing (starting Jan 2023). 800 samples from animal hosts (wild deer, cattle, pigs, poultry and sheep) have been sequenced to date. Isolation of E. coli from shellfish, wastewater, abattoir animals and selected food samples also continues as planned. Expansion of the range of food sample sources is being considered, as is winter wastewater sampling to allow comparison of summer and winter isolates. A first phylogeny of human sample data (which was contributed by a collaborator) has been produced. A first MLST tree comparing the diversity of blood stream and UTI human samples against livestock, poultry, deer and canine samples has also been produced. Discussions around access to sequencing data from clinical isolates to allow comparison of E. coli genomes from animal, food and the environment with clinical datasets continue.

WS2 – New surveillance approaches

WS2a Update: Following a substantial amount of planning and protocol development the Taw and Torridge pilot site wastewater, river water and shellfish sampling and analysis was successfully initiated in January. Sampling and analysis has also begun at the North Wales pilot site being led by Bangor University. Analysis of UKHSA COVID-19 archived wastewater samples for Norovirus is underway at the Environment Agency and the first batch of Norovirus positive samples have been transferred from EA to Cefas for whole genome sequencing.

WS2b Update: Alongside the continuation of raw meat E. coli isolate sequencing, WS2b AMR surveillance has seen the start of sample collection and analysis on two projects lead by VMD and APHA investigating AMR trends, one on raw milk in collaboration with the National Milk Laboratories and one on animal feed (raw ingredients and finished feed) in collaboration with a feed mill. Sheep abattoir recruitment is ongoing for the sheep survey project (FSA, Defra, VMD and APHA) and piloting of methods has started for the cattle survey project (SRUC).

WS2c Update: The Norovirus and AMR wastewater monitoring and spread in care homes project, led by Queen's University, has begun. Autosamplers have been installed at 5 Belfast wastewater treatment plants, sampling has been initiated and bioarchiving is underway. Analysis protocols and bioinformatic workflows development is underway, linking in to other workstreams where appropriate. Silica Particle-Encapsulated DNA (SPEDs) for modelling of pathogen spread development is progressing well.

WS3 – Rapid, in-field diagnostic technologies

WS3a Update: The research design document setting out the agreed scope, was successfully delivered by Fera in October 2022. Subsequently, the horizon scanning literature review (in collaboration with the University of Lincoln) has resulted in 13,000 hits on broad potential technologies and 5,000 hits on a more focused 'known' FBD diagnostics technologies. Hits are being tagged per technology to make the next step, review of full text, more efficient. Technology readiness level (TRL) definitions have now been developed and are undergoing

review ahead of being incorporated in to the TRL framework. Outreach to stakeholders and potential end users has generated over 20 responses to date and will continue using a snowballing approach.

WS3b Update: 20/30 Labs have been awarded the contract to deliver the laboratory aspects of the Loop-mediated isothermal amplification (LAMP) detection of foodborne pathogens in wastewater project discovery phase, led by Environmental Monitoring for Health Protection (EMHP) at UKHSA. The project was initiated in December 2022 and will initially focus on investigating the use of LAMP for the detection of *Salmonella* spp, *Listeria monocytogenes* and Norovirus in wastewater, with a secondary aim of also including adenovirus, astrovirus, rotavirus and sapovirus if possible.

WS4 - Environment AMR surveillance system pilot

WS4 Update: Chemical analysis for phase 1 and 2 of the pilot river sampling work is in the final stages. Microbiological analysis (MIC testing) and molecular analysis (high throughput detection and quantification of Antibiotic Resistance with Resistomap) is progressing. The last phase (phase 3) of river catchment sampling will begin in Jan/Feb 2023. The following other R&D projects remain ongoing and are progressing:

- 'AMR shellfish' project with Cefas
- 'Bioaerosol' project with WSP, Cranfield university and University of Exeter
- 'Disinfectant' project with University of Exeter, UKCEH and Cardiff Uni
- 'Bathing Waters' project work undertaken by Atkins and UKCEH
- Wild flora and fauna project (the final report is expected shortly)
- Three projects reviewing and exploring different aspects in relation to minimum selection concentrations for antifungals and antibiotics with University of Exeter and UKCEH
- Development of the exemplar Environmental Surveillance System (supported by Deloitte) continues. Wireframe meetings took place in December 2022 and January 2023. The Alpha phase of development is concluding and the Beta phase is expected to start in February 2023.

Discovery work for a future AMR One Health Surveillance System will resume in January 2023.

✋ Meet the programme

Each quarter we will spotlight people working across the programme. In this issue we are focussing on some of the Food Standards Scotland technical leads working across WS1b:

Dr Louise Crozier, Scientific Adviser, Food Standards Scotland

I work in the Foodborne Illness Control team within the Science Division of Food Standards Scotland, supporting a variety of projects aimed at reducing foodborne disease in Scotland. Previously I worked for several years in the private sector with novel technologies for extending the shelf life of food products by reducing foodborne pathogens and food spoilage microbes via ozone or bacteriophage.

My current role involves organising the sampling frameworks and logistics for the FSS Scottish Pilot for PATH-SAFE, which is focused on understanding the relationships between *E. coli* isolated in Scotland from a wide range of sources, including animal hosts (cattle, sheep, pigs, poultry, deer), wastewater, shellfish and a variety of food products. These isolates will be compared to *E. coli* from clinical samples (urinary tract, bloodstream and gastrointestinal infections) to understand more about the *E. coli* that cause severe human disease in terms of their source attribution. As well as this, the anti-microbial resistance (AMR) profile of *E. coli* from various sources and the relationships between them will be examined to understand levels of AMR within a model organism from farm to fork.

Dr Adriana Vallejo-Trujillo, Research Fellow, Food Standards Scotland

I work as a post-doctoral research fellow (bioinformatician) for the PATH-SAFE Scottish pilot project and the Roslin Institute. Previously, I have worked in population genetics and adaptation of different livestock species including south American camels, cattle adapted to high elevation and indigenous chicken. These previous experiences have allowed me to develop skills in bioinformatics, evolutionary biology and landscape genomics, which I am now applying into this new role.

My main job is to perform the curation and genomic analyses of the Whole Genome Sequence data produced thought the Scottish pilot. These analyses included the phylogeny, genetic characterisation analyses, and producing host attribution models using Machine Learning. We have currently analysed more than 1700 *E. coli* genomes collected from different animal host (livestock, poultry, dogs and deer) as well as humans. Our next aim is to complete these analyses for around 3500 genomes including other sources as wastewater, shellfish and food products. Once completed, this information will represent the biggest and most comprehensive collection of *E. coli* genomes using a One Health approach in Scotland and the UK.

For further information

For any questions, feedback or to sign up to our mailing list, please contact the team at PATH SAFE team.

Keep up to date with PATH SAFE.