Antimicrobial resistance in biofilms formed during secondary food processing of meat and meat products

Area of research interest: Antimicrobial resistance
Study duration: 2020-05-01
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Project code: FS307035
Conducted by: Fera Science Ltd

Background

Antimicrobial resistance (AMR) is a global threat to public health, resulting in hard to treat infectious diseases as the bacteria responsible become resistant to antibiotics. The FSA has a role to play in fighting AMR, specifically by establishing the links between AMR and food, improving the knowledge of AMR transfer through the food chain and assessing the effectiveness of current treatments and hygiene practices. Food safety is recognised as a component of the 2019-2024 UK National Action Plan which sets out actions to slow the development and spread of AMR.

Biofilms offer favourable conditions for an increase in bacterial resistance to antimicrobials. They can form on non-food contact surfaces within food processing environments, particularly on machinery that is difficult to reach and clean. Bacteria and fragments of biofilm in these environments could potentially contaminate food intermittently.

Objectives and approach

This project will study the AMR genes associated with biofilms found in the food processing environment.

The project will sample 165 biofilms from a number of secondary meat processing facilities. These samples will undergo metagenomic analysis using Illumina DNA sequencing. 24 samples will also undergo PromethION-based DNA sequencing. These two sequencing methods will be compared to each other to improve the accuracy of the long reads produced by the PromethION and the assembly of the short reads produced by Illumina sequencing.

Although identification of individual organisms will be unlikely, comparison of the data to various sequencing databases will allow the identification of AMR genes in the samples.

Quantitative polymerase chain reaction (qPCR) analysis will be used to estimate the abundance of selected AMR genes in all samples.

The data obtained from this project will be analysed in the context of other published scientific studies, and used to estimate the contribution of biofilms in meat processing plants to the AMR

burden.

This research will provide important insights into how fit for purpose existing AMR surveillance and risk management strategies are. The work will also help inform risk assessments on AMR and identify areas where further research is required.