Modelling framework to quantify the risk of AMR exposure via food products - example of chicken and lettuce

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Background

Antimicrobial resistance (AMR) is a complex issue where microorganisms survive antimicrobial treatments, making such infections more difficult to treat. It is a global threat to public health.

To increase the evidence base for AMR in the food chain, the FSA has funded several projects to collect data to monitor the trends, prevalence, emergence, spread and decline of AMR bacteria in a range of retail foods in the UK. However, this data and information from the wider literature was yet to be used to create tools to aid in the production of quantitative risk assessment to determine the risk to consumers of AMR in the food chain. To assist with this, there was a need to develop a set of modular templates of risk of AMR within foods. This sought to allow the efficient creation of reproducible risk assessments of AMR to maintain the FSA at the forefront of food safety.

Objectives and approach

This study sought to review the literature and use the information gathered (in addition to data from previous published FSA studies) to create a set of templates of risk of AMR within the chicken and lettuce supply chain. These templates focused on all the processing stages, and consultation with industry was necessary in order to achieve a thorough understanding of the farm-to-fork processes.

The models were created in a user-editable form including graphical user interface and comprehensive annotation to allow for their adaption to new and emerging risks. The challenge was to develop flexible modules that can be used “off the shelf” with minimum to no modification needed once adapted. To facilitate their use by non-experts, the templates included a user-friendly interface where users were able to input important information into the model. They would also include comprehensive annotation and additional training materials, allowing for their adaptation to other food chains as well as new and emerging risks. The models should therefore also be flexible in terms of the training/input data that users can upload to assess risk.

This work sought to enable the production of more efficient and reproducible AMR risk assessments, as relevant steps in the food chain are available "off the shelf” and will allow the FSA to facilitate collaborative working and inform more complex, multi-factorial risk assessments. The use of these models will also allow for better prioritisation of risk management interventions, and establishment of better food production techniques to limit the spread of AMR and promote

good practice in the food chain.

Results

To test the adaptability of the tool to various pathogens and different food production chains, two combinations of microorganisms (E. Coli and Campylobacter spp.) and two very different food productions were used: the chicken and the lettuce production chains.

The results showed that the model outputs were consistent with the existing scientific literature and therefore provided reliable results. One of the major strengths of the tool is its adaptability and flexibility to test new microorganisms and/or to change some attributes, steps of the food value chains.

During the development of the tool, it was clear that for some variables used in the tool there was scarce availability of data especially for a number of AMR-related parameters. However, this did not represent a major obstacle towards the development of the tool which was the main objective of the project. Still, future studies should focus on improving the amount of data available on these parameters to be able to obtain more accurate outputs from the tool particularly for antimicrobial resistant microorganisms.

Read the full data sets at Data.gov.uk: R Script for: Modelling framework to quantify the risk of AMR exposure via food products

Report

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