

Update on FSS's foodborne illness reduction strategy

1 Purpose of the paper

- 1.1 This paper is for discussion and agreement. Its purpose is to update the Board on the current status of foodborne illness in Scotland, and describe FSS's current and future priorities for reducing the public health risks associated with pathogen transmission through the food chain.
- 1.2 The Board is asked to:
 - **Note** the current profile of foodborne illness in Scotland and work undertaken to date to support the strategy.
 - **Note** the proposed future priorities and direction of our strategy for tackling foodborne illness in Scotland.
 - **Agree** that FSS should explore further the introduction of thresholds for action for each of the pathogens based on either a UK or Scottish specific threshold.

2 Strategic aims

- 2.1 The delivery of the strategy for reducing foodborne illness in Scotland supports FSS Strategic Outcome 1 – Food is Safe and Authentic and is underpinned by Goals 3, 4 and 5 of [our strategy for 2021-26](#).

3 Background

- 3.1 In April 2017, FSS published its strategy¹ for reducing foodborne illness in Scotland. The framework adopted in the strategy allows contamination risks to be viewed in a holistic manner; supporting the identification of key transmission pathways for pathogens in the food chain. It aims to support the identification of appropriate points within these pathways at which interventions are likely to have the greatest potential for preventing or controlling contamination and reducing the risks to human health.
- 3.2 Since the publication of the strategy, the Food Protection Science and Surveillance (FPSS) team presented an update to the [Board in May 2019](#) on our progress to date in tackling campylobacter in the food chain. However this is the first update to the Board on our broader programme of work to address foodborne illness in Scotland.
- 3.3 The latest estimates derived by Food Standards Agency (FSA) suggest that the total annual cost burden of foodborne disease in the UK is approximately £9 billion².

¹ [A Strategy for reducing foodborne illnesses.pdf \(foodstandards.gov.scot\)](#)

² [New research shows societal burden of foodborne illness in the UK | Food Standards Agency](#) (taken from [The Burden of Foodborne Disease in the UK 2018](#))

This figure is based on the estimated number of infections that are thought to be linked to the consumption of microbiologically contaminated food and takes account of the healthcare and wider societal costs associated with these illnesses.

- 3.4 This paper focusses only on the microbiological pathogens which have the highest disease burden in Scotland in terms of incidence, symptom severity and mortality; namely campylobacter, salmonella, Shiga toxin producing *E. coli* (STEC), *Listeria monocytogenes* and norovirus. It describes the work we have undertaken to control the risks associated with these pathogens and outlines our future priorities for tackling foodborne illness in Scotland.

4 Discussion

- 4.1 A summary of the current profile of foodborne illness in Scotland and action taken to date to support the strategy for reducing foodborne illness is presented in Annex A. The overall framework for delivering the strategy for reducing foodborne illness in Scotland will remain unchanged, however the focus of the strategy over the coming period will predominantly be on five key work areas to ensure maximum impact.

- i) Reviewing and strengthening the uptake of interventions to support campylobacter reduction.
- ii) Supporting businesses and consumers to minimise the risks of *Listeria monocytogenes*.
- iii) Understanding the epidemiology of foodborne infection in Scotland.
- iv) Improved targeting of consumer advice aimed at educating the public on the particular risks to vulnerable groups and how they can be avoided.
- v) Exploring the use of targets based on the number of reported infections of key pathogens as a means of monitoring trends and triggers for action.

Campylobacter

- 4.2 As campylobacter remains the biggest cause of bacterial foodborne disease and places a significant burden on the NHS, preventing its transmission through the food chain will remain a key priority for FSS. Raw poultry meat is recognised as a major contributor to campylobacter infection worldwide and an FSS funded source attribution study showed chicken related strains were most commonly identified in human illness in Scotland (52-68%). It is important to note that due to the integrated nature of our poultry supply chain, addressing campylobacter risks in chicken relies on a UK wide approach, and effective partnership working with FSA is essential in enabling us to influence action by the industry and maximise our resources and impact.
- 4.3 Between 2000 and 2014, the FSA led a UK campylobacter strategy which was based on research to identify interventions that were effective in reducing the levels

of contamination at all stages of the UK chicken production chain, and engagement with the industry to promote their implementation. A key output of the UK strategy was the development of a joint government/industry target which aimed to reduce the percentage of the most heavily contaminated chickens on the market and agreement by the retailers to openly publish their progress in achieving this target. Whilst this data has suggested a reduction in the levels of contamination on chicken, there has been very little change in the number of human cases or attribution to chicken related strains of campylobacter, although the underlying reasons for this are unclear.

- 4.4 Ten years on, it is timely to review the UK campylobacter reduction strategy, and we have agreed to work with the FSA to develop a joint workplan aimed at understanding how chicken currently contributes to infection rates, and where interventions need to be strengthened. This year, we will be publishing the results of an FSA/FSS funded survey on the presence of pathogens and antimicrobial resistance in retail chicken which will provide updated prevalence data for campylobacter and a baseline for comparison with industry data and previous FSA/FSS retail surveys. We will also undertake a mapping exercise which will help us to understand the interventions currently employed along the food chain by farmers, processors and retailers to reduce campylobacter contamination. This will enable us to identify priorities for new research, as well as resources and interventions which will help to drive further improvements.
- 4.5 Whilst attribution work has shown chicken to be the biggest source of campylobacter infection, other food sources have been implicated in cases of illness. In particular, retail livers and duck meat, have been shown to be contaminated with high levels of campylobacter, and these products are often cooked pink. Therefore, communication with caterers and consumers about the risks of campylobacter in these types of foods and how they can prepare them safely will continue to be a focus going forward. Additionally, we will continue to support PHS and Scottish Government in the development of strategies for controlling environmental exposure to campylobacter, which is known to contribute to infection in Scotland, particularly in rural areas.
- 4.6 We will continue to promote messages to the older population on the severity of illness from campylobacter and the steps they can take to prevent infection. Strengthening of our partnerships with organisations who engage with this demographic, such as Age Scotland and Carers Scotland, as well as health professionals, will ensure our messages are disseminated to the intended audience in an effective manner. This partnership building is already underway, with plans to extend networks through a new relationship we have developed with the Scottish Government Cross Party Group on Older People, Age and Ageing which will present opportunities to raise awareness of the impact of foodborne illness on the older population and seek support from participating member organisations in reaching this demographic.

Listeria

- 4.7 The severity and high mortality rate of cases of *Listeria monocytogenes* infection requires continued action to tackle this pathogen in the food chain. *Listeria* is widespread in the environment however most cases are due to contaminated food. It is an unusual bacterium because it can grow at low temperatures, including refrigeration temperatures below 5°C. It is also capable of surviving within biofilms on equipment, utensils, floors, and drains, leading to cross-contamination risks in final products. For this reason, it is of most concern in chilled ready-to-eat foods that do not require further cooking or reheating.
- 4.8 Over the last year, outbreaks and deaths associated with the consumption of smoked fish and unpasteurised cheese have highlighted the technical challenges encountered by small to medium sized food producers in controlling listeria. Due to the ability of the pathogen to persist in the food production environment and grow at low temperatures there is a particular need for guidance on shelf life validation to ensure appropriate durability dates are applied, and the sampling regimes required to verify the effectiveness of cleaning methods in removing listeria from surfaces and equipment. We will therefore work with Local Authorities and the industry to identify how existing guidance, including our [decision support tools](#) can be further developed and extended to a wider range of sectors to support improvements in this area.
- 4.9 Risk communication to consumers on listeria will be a key strand of work taken forward through both a review of advice currently available on the FSS website and working with public health partners such as PHS and NHS Inform. Building on new research aimed at improving our understanding of groups who are most vulnerable to infection (see below), we will engage with social scientists and communications specialists to ensure our advice is accessible and practical and likely to have impact in driving behaviour change by those likely to be at highest risk of infection.
- 4.10 The final strand of work will consider public sector procurement and provision of food in care settings. In 2019, an outbreak of listeria was linked to pre-packed sandwiches provided in hospitals. This resulted in an independent review³ of NHS hospital food being commissioned which made a number of recommendations. Food safety recommendations stated that purchasers must have effective mechanisms in place to assure food safety within their supplier base and drive improvements where necessary to ensure all businesses supplying high-risk foods meet the highest standards. FSS will review its existing guidance for controlling listeriosis in healthcare settings⁴ and continue to promote it to the relevant sectors.

Epidemiology of infection

- 4.11 The clinical data that PHS collects and analyses through national surveillance holds a wealth of information on the epidemiology of foodborne illness in Scotland. This

³https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/929234/independent-review-of-nhs-hospital-food-report.pdf

⁴ [Listeria Guidance.pdf \(foodstandards.gov.scot\)](#)

epidemiological research helps FSS to understand how many people have clinical illness associated with foodborne pathogens, if those numbers are changing over time, how the illness affects different population groups in our society, and the burden on the economy.

- 4.12 By previously recruiting a dedicated epidemiologist within PHS to access and link NHS clinical datasets, FSS was able to ensure our work programme to address the increased risk of campylobacter infection in the older population was driven by robust scientific evidence on the epidemiology of reported illness across Scotland. We have recognised that there is significant potential in extending these analyses across all of our foodborne pathogens of interest, particularly alongside genomics data, which is becoming increasingly available and can provide additional insights into the characteristics of pathogen strains that lead to the most severe health outcomes. Through our refreshed [partnership agreement with PHS](#), we intend to reinstate this arrangement to ensure FSS has on-going analysis of patient data and that we are able to monitor the affected demographics in Scotland, and determine where to focus future interventions.

Vulnerable groups

- 4.13 Foodborne illness can affect anyone, and FSS's current food safety advice is relevant for all consumers; based on promoting awareness of the 4C's (cleaning, chilling, cooking, avoiding cross-contamination). However as reported through the work undertaken by PHS and highlighted throughout this paper, some pathogens can have a disproportionate effect on certain demographics within society such as the elderly, young, pregnant and immunocompromised. To date, we have considered these demographics as a single category termed 'Vulnerable Groups'. However, whilst the provision of tailored advice is straightforward for people within this group who have well defined vulnerabilities (e.g. for pregnant consumers who are recommended to adjust their diets to accommodate for their increased susceptibility to *Listeria monocytogenes*), the definitions that are currently used for others (such as 'elderly' '65+' and 'young children') are extremely broad and as they do not take into account lifestyle factors, behaviours and health status, are not likely to accurately reflect the range of risk levels that are likely to exist within such groups.
- 4.14 By way of example, those aged 65+ in Scotland make up a significant part of the population: in the [2011 census](#)⁵, 16.8% of the Scottish population were aged 65 and older, meaning that over 890,000 people would be classed as "vulnerable" based on the current definition by age. This figure is likely to increase as the population ages, and it is therefore important that our advice is proportionate and does not lead to restrictions on food choices in later life, especially where there may be trade-offs with respect to dietary health (e.g. ready to eat oily fish which can present a risk of listeria).

⁵ The census is undertaken every 10 years in Scotland and 2011 is the latest completed report. The 2021 census in Scotland was moved to 2022 due to the impact of the COVID-19 pandemic, and the full results are not yet published.

- 4.15 In order to refine our future consumer messaging approach, FSS will commission an independent review of the current definition of “vulnerable groups,” to determine if this can be refined based on up to date evidence on the range of underlying health and lifestyle factors that can make people in these groups more susceptible to illness. The findings from this work will be used to support risk assessments and social research to identify communication methods that are most likely to reach the individuals that could be at increased risk. By developing a more tailored approach, we will ensure this type of advice is suitably targeted, proportionate and is not unnecessarily restrictive – especially for the older population.
- 4.16 In addition to the four work areas described above, FSS will continue to work with PHS to monitor trends in foodborne illness and any changes in reporting which could be having an impact on the figures we rely on to prioritise our work. In parallel, we will continue to maintain an awareness of emerging risks and technologies alongside changes in consumer behaviours to identify any issues which may impact on cases of illness in Scotland and require intervention.

Measuring impact

- 4.17 FSS currently uses PHS data on confirmed laboratory reports for the five key pathogens to monitor how foodborne illness is changing in Scotland each year, and consideration has previously been given to the introduction of a threshold value that would trigger the need for action upon identification of an upward trend. However, these figures need to be interpreted with caution due to underreporting, our inability to disaggregate food and non-food sources, changes in demographics, and impacts of year to year fluctuations in environmental factors, such as weather.
- 4.18 As a result of this year to year variation, and the low number of reports for certain pathogens in Scotland, it has proven challenging for FSS to derive appropriate threshold levels that would be indicative of meaningful change. However FSA has previously developed a trigger system for foodborne pathogens and is undertaking a review to assess how this could be applied to support our refreshed workplans for tackling foodborne illness. We intend to work with the FSA and our own data scientists to consider how this system should be applied on a UK wide basis and also the feasibility of developing separate threshold values that are specific to Scotland. When the number of reported cases breach the threshold the following actions would be considered:
- an investigation, with PHS and where appropriate FSA, to identify the reasons behind the increase.
 - additional food and feed sampling associated with the pathogen.
 - development of an action plan to identify research and interventions to further mitigate the risk.
 - disseminate appropriate risk communication to consumers using tailored food safety messages.

- 4.19 The adoption of UK wide thresholds by FSS would require any breaches to be considered in the Scottish context, for instance England's higher case numbers will have more of an impact on any breach, masking any regional differences in infection levels. Conversely, the adoption of Scottish specific thresholds may be problematic for the pathogens with lower cases numbers, such as *Listeria monocytogenes*, where confirmed laboratory reports are generally less than 20 each year and year to year variations tend to be larger, which may lead to breaches occurring more frequently.

5 Identification of risks and issues

- 5.1 There are risks to the delivery of this strategy through the limited resources available, with respect to both budget and staff. To mitigate against this, continuing our close partnership working with FSA, PHS and other public health partners will be key in maximising resources to achieve the desired outcomes.

6 Equality Impact Assessment and Fairer Scotland Duty

- 6.1 Equality Impact Assessments and Fairer Scotland Duty Assessments will be carried out on the specific actions that are developed to support the priorities outlined in this paper to ensure any initiatives do not raise issues or create disadvantages for any specific population groups.

7 Conclusion/Recommendations

- 7.1 The Board is asked to:
- **Note** the current profile of foodborne illness in Scotland and work undertaken to date to support the strategy.
 - **Note** the proposed future priorities and direction of our strategy for tackling foodborne illness in Scotland.
 - **Agree** that FSS should explore further the introduction of thresholds for action for each of the pathogens based on either a UK or Scottish specific threshold.

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ANNEX A – Current profile of foodborne illness in Scotland and work undertaken to date to support the strategy for reducing foodborne illness

Epidemiology of foodborne illness in Scotland

- The number of reported cases of infectious intestinal disease (IID) caused by the most common foodborne pathogens in Scotland has remained relatively stable since 2015 (Figure 1). It should be noted that the number of reported cases only represents those which are detected through the testing of faecal samples submitted to NHS laboratories by General Practices following the presentation of a human case to a doctor’s surgery. Therefore, the true prevalence of illness in the community caused by some pathogens is estimated to be significantly higher. The rate of under-reporting in the community varies between the pathogens (from 1.0 for *Listeria monocytogenes* to 288 for norovirus), which is largely reflected by the severity of illness observed for each pathogen⁶.

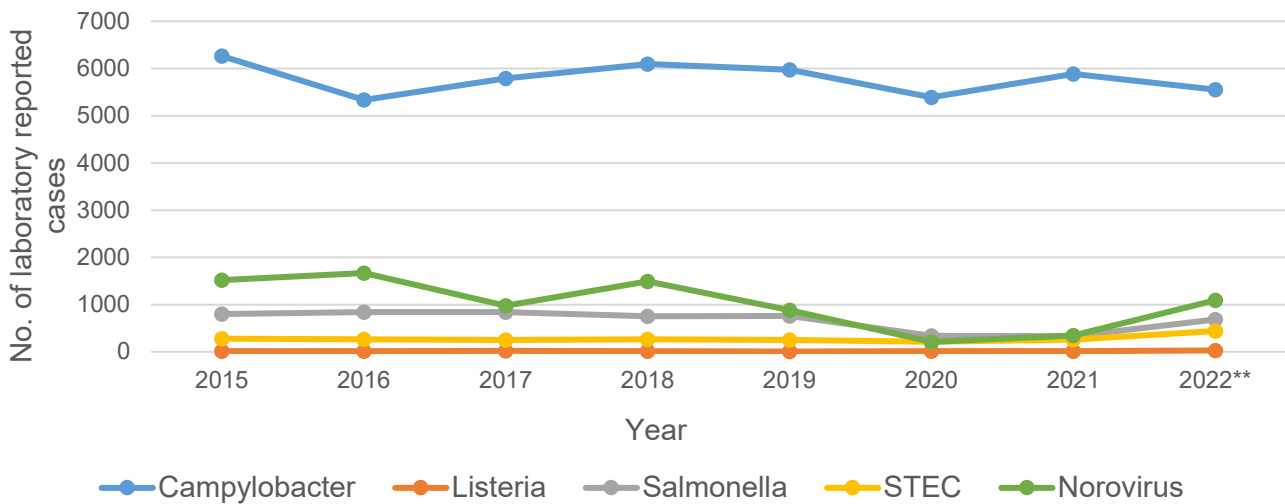


Figure 1: Number of reported cases for the top five foodborne pathogens in Scotland. Data courtesy of Public Health Scotland. **2022 figures are provisional case data.

- To date, our work on foodborne illness reduction has placed particular focus on campylobacter, *Listeria monocytogenes* and Shiga toxin producing *E. coli* to take account of the specific challenges associated with these pathogens and their impacts on public health and food sectors in Scotland. For salmonella and norovirus, a considerable proportion of cases are attributed to factors out with FSS’s control. In 2019, PHS reported that approximately 47% of Salmonella cases in Scotland were thought to have been acquired abroad, and it is understood that the majority of norovirus infections (estimated at between 62-84%) result from

⁶ The Second Study of Infectious Intestinal Disease in the Community (IID2 Study) FSA Project B18021 <http://www.foodstandards.gov.scot/second-study-infectious-intestinal-disease-community-iid2-study>

person to person spread^{7,8}. Further to this, National Control Programmes are already established across the UK to reduce the prevalence of salmonella in poultry and pigs (the most important sources) at primary production level. For norovirus, foodborne transmission is estimated to be responsible for around 16% of cases⁹, with controls focussed around personal hygiene to avoid the contamination of food throughout the production chain.

- Campylobacter remains the most commonly reported cause of bacterial foodborne illness in Scotland, a picture that is also observed in the rest of the UK and much of the developed world. In the UK, reporting is believed to under-estimate the actual number of campylobacter infections in the community by nine-fold, which would suggest an estimated 50,000 cases of campylobacter infection occurred in Scotland in 2022. The direct healthcare costs (costs associated with hospital admissions, length of stay and required laboratory testing) associated with campylobacter infection in Scotland is estimated at £2.96 million every year¹⁰. The full economic burden will be considerably higher, taking account of wider societal costs associated with time absent from work (for case or caring for dependent), reduced productivity due to staff absence, and costs associated with longer term sequelae that can result from infection.
- Previous research undertaken in collaboration with Public Health Scotland (PHS)¹¹, has shown that human campylobacteriosis is more common in the older population with an increased likelihood of hospitalisation and severe outcomes for this demographic. Furthermore, a link has been identified with socioeconomic status with individuals living in more deprived areas reporting fewer cases of infection than those living in the least deprived areas. However, the risk of hospitalisation is significantly greater for those individuals living in the more deprived areas compared to the least deprived.
- Although the number of reported cases of *Listeria monocytogenes* is significantly lower than that observed for the other pathogens, the severity of illness is much higher, especially for vulnerable groups (defined as young children, those who are pregnant, aged over 65 or have a weakened immune system due to medication or illness), and has a higher mortality rate.
- Scotland continues to have the highest reported rate of Shiga toxin producing *E. coli* (STEC) in the UK. STEC infection can lead to the development of Haemolytic Uraemic Syndrome (HUS) which may result in kidney failure with the risk highest in children aged under 5 years. In 2022, the observed increase in STEC cases can be linked to two nursery outbreaks (neither of which were attributed to food), with

⁷ [Novel Surveillance Network for Norovirus Gastroenteritis Outbreaks, United States - PMC \(nih.gov\)](#)

⁸ [Genotypic and Epidemiologic Trends of Norovirus Outbreaks in the United States, 2009 to 2013 - PMC \(nih.gov\)](#)

⁹ [Assessing the contribution made by the food chain to the burden of UK-acquired norovirus infection](#)

¹⁰ [Campylobacter: Estimating the healthcare cost of gastrointestinal infection in Scotland | Food Standards Scotland](#)

¹¹ [Campylobacter: Estimating the burden of gastrointestinal infection in Scotland using data linkage | Food Standards Scotland](#)

45 cases attributed to an *E. coli* O157 outbreak and a 12 cases linked to a non-O157 *E. coli* outbreak. Another 26 reported cases were linked to a larger UK wide cluster for which no vehicle was identified. Additionally, developments in laboratory testing methods has resulted in the ability to more readily detect non-O157 STECs, which has also had an impact on the number of reported laboratory cases.

- The COVID-19 pandemic and the implemented restriction measures in 2020 and 2021 resulted in a change in the reported trends of foodborne illness in Scotland, but the impact was not equal between the pathogens. Campylobacter case numbers were only reduced during March-May 2020 during the implementation of the first national lockdown. This transient reduction was possibly due to a reduction in access to healthcare services and sample submission during the initial stages of the pandemic. Conversely, longer and more sustained reductions were observed for norovirus and salmonella laboratory reports, although likely for very different reasons; salmonella due to a reduction in travel abroad over 2020 and 2021 and norovirus due to increased physical distancing and hand hygiene during the pandemic and reduced access to care homes and other institutions where outbreaks are often observed. As restrictions have been eased, laboratory reports appear to be returning to pre-pandemic levels.

FSS’s strategy for reducing foodborne illness in Scotland and key outputs to date

- The framework of FSS’s strategy is based on a source-pathway-receptor approach, targeting the key transmission pathways for foodborne illness from the source of the contaminant through all stages of the food chain to the final consumer. FSS has commissioned evidence gathering research projects and used the outputs to implement a range of interventions to mitigate the risks to public health at each of these stages (Figure 2).

Source		Key research and interventions to date
Environment and sources		<ul style="list-style-type: none"> • Prevalence and transmission of STEC in the food chain, particularly via cattle. • Seasonality of shedding <i>E. coli</i> O157 and control methods on farms. • Improvement of biosecurity on farms to prevent colonisation of broiler chicken with campylobacter. • Development of decision support tools for fresh produce growers..
Food	Processed	<ul style="list-style-type: none"> • Surveillance of pathogens and AMR in the food chain. • Research to enable the development of guidance for industry to allow the production of safe food and support risk assessment.
	Unprocessed	<ul style="list-style-type: none"> • Development of decision support tools for smoked fish industry. • Supporting food businesses to meet legislative requirements (process hygiene criteria for campylobacter).
Meal	Catering	<ul style="list-style-type: none"> • Guidance to support butchers and caterers in controlling cross-contamination, and the safe cooking of less than thoroughly cooked burgers. • Review of food handlers fitness to work guidance, and development of food safety at community events guidance
	Domestic	<ul style="list-style-type: none"> • Research to understand consumer attitudes and behaviours (surveys, consumer focus groups and qualitative/quantitative research). • 4C consumer advice in the home (website updates, advertising campaigns, engagement at events, school resources)
Human cases		<ul style="list-style-type: none"> • Research on the financial burden of foodborne disease in the Scotland. • Impact of COVID-19 on foodborne illness and consumer behaviours • Understanding epidemiology of campylobacter infection in Scotland • Source attribution studies of foodborne pathogens in Scotland.

Figure 2: Summary of FSS evidence gathering projects and interventions applied throughout the food chain to reduce foodborne illness.

i) Environment and sources

- Research undertaken to date to understand the transmission and sources of pathogens in the environment and potential routes of entry into the food chain has largely focussed on STEC and ruminants, particularly cattle and wild game. The most recent research, published in 2018, reported that about 24% of Scottish cattle farms were positive for *E. coli* O157 and this had not significantly changed over the previous 20 years. A key finding from this study was that cattle in Scotland are dominated by a strain that is associated with more severe clinical disease compared to the strains shed by cattle in England and Wales. In light of the public health implications, FSS has focussed on interventions aimed at reducing the risks of transmission at the primary production stage by exploring the feasibility of introducing methods that can reduce *E. coli* O157 shedding by cattle and developing [online decision support tools](#) to support growers of fresh produce in identifying and mitigating the risks of faecal contamination during crop production.
- FSS has also invested in the development and implementation of interventions to prevent the introduction and spread of campylobacter at primary production. Through close collaboration with industry and Scotland's Rural College (SRUC), we have rolled out an education programme to farm staff and poultry catchers on how to implement robust biosecurity measures to reduce the risk of introducing campylobacter into the flock.

ii) Understanding and reducing risks in the food chain

- Continued surveillance of pathogens and antimicrobial resistant (AMR) bacteria in the food chain has provided FSS with datasets to assist in understanding the prevalence of foodborne pathogens and target interventions to the food products that are at greatest risk of contamination. For instance, surveys on the prevalence of campylobacter in raw retail chicken resulted in the industry working together with FSA and FSS to identify and implement strategies throughout the food chain that are capable of reducing campylobacter levels on retail chicken. Additionally, the ongoing surveillance of animals and food products for the presence of organisms with antimicrobial resistance is a key element of the UK national action plan to understand how the food chain contributes to AMR exposure and track changes over time.
- Research to understand current food safety practices and challenges in industry has provided FSS with the evidence base to develop guidance and tools to assist food businesses in producing safe food. Notably, a [decision support tool](#) was developed to support the smoked fish industry to assess risks during production and assist in the setting of product shelf-life.

iii) Promoting safe food handling practices

- As we move along the framework to the preparation of food both at catering establishments and in the home, the focus has been on the development of guidance and advice to support food handlers in producing safe food. Guidance is

available to support butchers and caterers in controlling cross-contamination¹² within their business, and to support the safe cooking of burgers served less than thoroughly cooked¹³. A review of the food handlers fitness to work guidance¹⁴ was undertaken and supplemented with guidance for food handlers organising community or charity events. Additionally, FSS has collaborated with Zero Waste Scotland to ensure guidance is available to food businesses on the safe redistribution of surplus food¹⁵.

- To support consumers in the home to store and prepare food safely, extensive research has been undertaken to understand consumer attitudes and behaviours to food safety. This evidence gathering has been through the use of surveys, consumer focus groups and research to gain both qualitative and quantitative data, which allows FSS to track trends over time and provide clear advice on the 4Cs to consumers through advertising campaigns and engagement at national and regional events, such as Royal Highland Show.

iv) Targeting the population groups at highest risk

- Collaboration with PHS to link data sets on the number of reported cases with hospitalisations, deaths and prescription records has been invaluable in furthering our understanding of the epidemiology and financial burden of foodborne disease in Scotland. An example of this has been the linked dataset developed for campylobacter which, when analysed alongside research commissioned to understand the source attribution of campylobacter cases, showed that the older population were more likely to become infected with a strain that was associated with chickens. This information has allowed FSS to develop targeted interventions and resources to educate this demographic on the risks and provide practical advice on how they can prevent infection. Through the development of a new partnership approach during 2022 and early 2023, FSS was able to set up stands at two major retailers which provided an opportunity to engage directly with customers on campylobacter at a key touch point for linking our food hygiene advice with their own practices. Through this project we also attended assisted living premises to deliver presentations and published editorial pieces aimed at older age groups in a number of national and regional newspapers.

¹² [E.coli O157 Control of Cross - Contamination .pdf \(foodstandards.gov.scot\)](#)

¹³ [SFELC - Guidance on the Safe Service of Less Than Thoroughly Cooked Beef Burgers. | Food Standards Scotland](#)

¹⁴ [Food handlers - Fitness to work v6 - Final - December 2019.pdf \(foodstandards.gov.scot\)](#)

¹⁵ [Surplus Food Redistribution | Zero Waste Scotland](#)