

Protecting consumers from infection with Shiga toxin-producing E.coli (STEC)

Guidance on the detection and risk management of Shiga toxin-producing E.coli (STEC)

This statement explains the UK's policy on the appropriate risk management when Shiga toxin-producing E. coli (STEC) is detected in food. It includes the UK regulatory approach to STEC and the effective food safety controls to maintain the supply of safe food.

This clarifies the UK policy for food businesses as they meet their responsibility to ensure the food they supply is safe and for enforcement authorities as they carry out official checks to ensure that businesses are applying appropriate controls.

This statement:

- will provide the foundation for a consistent response to STEC testing results so that public health is protected
- will clarify requirements for food businesses as they provide safe food and develop Food Safety Management System (FSMS) and Hazard Analysis and Critical Control Point (HACCP) control plans in relation to STEC

What is STEC?

[Shiga toxin-producing Escherichia coli \(STEC\)](#) are a group of pathogenic E. coli which can cause severe illness. It contains shiga toxin-producing genes, also known as stx and testing regimes for STEC are based on detection of this gene.

There are different types of STEC that may cause illness. STEC O157 currently accounts for most cases in the UK but non-O157 STEC's are also capable of causing severe disease.

The symptoms of STEC infection can vary from no symptoms to diarrhoea, abdominal pain, bloody diarrhoea, and haemolytic uremic syndrome (HUS), a serious condition that can lead to kidney failure and can be fatal. HUS develops in approximately 10% of patients infected with E. coli O157 and is the leading cause of acute renal failure in young children.

In 2018, there were 1513 confirmed cases of STEC reported in the England & Wales.

The infectious dose for STEC is relatively low, although there is uncertainty for strains other than O157:H7

Identifying the risk

Where there is an STEC risk associated with food produced, this must be considered in the FSMS or HACCP plan. As an example, STEC has been detected in a range of food including:

- beef and other meats
- fish
- milk and dairy products
- leafy vegetables/salads

- fruits
- sprouts and sprouted seeds
- herbs & spices
- uncooked flour and dough.

Sampling and testing for STEC

Sampling and testing is one of the ways to demonstrate that FSMS or HACCP procedures are effective and working properly. Enforcing authorities (including local authorities, the Food Standards Agency (FSA), and Food Standards Scotland (FSS)) may also carry out sampling as part of their official control activities.

Important

Using the correct sampling and testing method is extremely important. Testing should be carried out using an appropriately validated method for both screening and confirmation by culture.

Risk management

Risk management response to detection of STEC is determined by the intended use of the food. This can generally be divided into two profiles:

Profile 1 - Ready-to-eat (RTE) foods and foods to be consumed less than thoroughly cooked. The presence of any STEC in ready to eat food is unacceptable and should always be considered a serious risk to public health.

Profile 2 - Foods intended to be consumed following further processing that will remove the STEC risk, for example by achieving a 6-log reduction of harmful bacteria (including STEC).

Reduction in contamination with harmful bacteria is often expressed in scientific terms as log (short for logarithm) reductions.

A 1 log reduction is a ten-fold or 90% reduction in bacteria. A 6-log reduction is equivalent to killing 99.9999% of the bacteria initially present.

Initial test

A test known as polymerase chain reaction (PCR) is used to screen food for Shiga toxin genes (stx1 and stx2).

The result of the PCR test will indicate whether those toxin genes are present or absent in the sample. Where no genes are detected this is considered a negative result. Where the genes are detected, further tests are needed to determine whether STEC is present.

Negative PCR test result

No actions will normally be required. Food businesses should continue to apply their normal controls, sampling and testing regimes as laid down in your FSMS/HACCP.

Positive PCR test result

This is known as a presumptive positive result which indicates that the stx genes are present.

The [FSA's risk assessment](#) shows it is not possible to determine the public health risk based on the presence of stx genes alone i.e. the presumptive positive results. This is because the stx genes can be detected in the absence of viable E. coli cells or they may be present in other organisms or as free DNA.

In most circumstances, a presumptive positive result would trigger further confirmatory tests but would not require risk management action. However, the food business or enforcing authority may decide to take action at this stage, where the risk assessment, suggests that interventions, such as removing the food from the market, are necessary to protect public health. This would be based on additional information such as evidence of a breakdown in food safety management or a link to a foodborne illness outbreak, which indicates that contamination may have occurred, and the affected food may be unsafe.

Confirmatory test

Confirmatory tests are carried out following a presumptive positive result to determine whether STEC is present. These require the culture and isolation of E. coli colonies containing stx genes.

Negative result

A negative result means that it has not been possible to isolate an E. coli colony containing stx genes from the samples provided. Action is not required on negative confirmatory results provided there is no additional evidence that the food may be unsafe.

Positive result

A positive result means that presence of STEC has been confirmed by the isolation of an E. coli colony containing stx. The appropriate action will vary according to the food profile.

Actions

Profile 1 – Ready-to-eat foods

When STEC is confirmed in a batch of Profile 1 food this indicates a serious risk to public health. Affected batches and other batches or products which may have been contaminated must be removed from the market. FBOs have a legal obligation to inform their enforcing authority of unsafe foods and the potential food safety risks; and to collaborate with the enforcing authority on appropriate action and follow up investigations to identify the source of the contamination.

If the food is still within the control of the Food Business Operator (FBO), (and has not reached retail level), food may be re-directed for further processing if it can be rendered safe for its intended use. Where this approach is used it must be:

- included in the business's food safety management system
- approved by the enforcement authority as providing a sufficient level of public health protection

Profile 2 – Foods intended to be consumed following further processing method capable of eliminating STEC

Risk assessment shows it can be reasonably assumed that the risk presented by STEC-contaminated Profile 2 food products will be controlled by normal hygienic practices and conditions of use of the food by the food handler or consumer.

Consideration must be given to the risks associated with the presence of STEC within products taking into account instructions on storage, handling and use of the product. Where appropriate instructions are provided, and there is no additional information indicating a potential public health risk, affected product can remain on the market.

FBOs are responsible for documenting the risk management response to the isolation of STEC in the Food Safety Management System. Enforcement authorities should review the FBOs response during their routine official checks. In situations where handling instructions are not provided, or those instructions will not eliminate the STEC risk before consumption, (e.g. there are no cooking instructions or other controls to protect consumers) affected product must be treated according to food Profile 1.

Important

FBOs are legally obligated to provide to other businesses along the supply chain, or to the final consumer, mandatory information on products including instructions which may be necessary to ensure the food is handled, stored, cooked and consumed safely. Businesses supplying caterers, particularly those catering vulnerable groups are legally obligated to inform such caterers of any potential risks associated with their products.

Export

Businesses exporting food from the UK are responsible for understanding and complying with the requirements of the receiving country. Those controls may be different to those applied within the UK due to different approaches to controlling food safety. Where a decision is made to divert products that do not meet export requirements to the domestic market, the risks must be appropriately considered, taking account of UK food authority advice and products handled so obligations for placing safe food on the market are met and consumers remain protected.

About this information

This written policy statement reflects current working policy applied by the FSA and FSS. UK public health bodies, enforcement and industry stakeholders have been consulted and reference has been made to expert scientific opinion of [EFSA](#), the [Food and Agriculture Organisation](#) of the United Nations and World Health Organisation, and the [UK Advisory Committee on the Microbiological Safety of Food](#).

Further [information](#) about STEC is provided on GOV.UK.