

Requirements and overview of cooking methods

Bacteria associated with less than thoroughly cooked burgers, requirements for managing the risk to consumers and overview of cooking methods.

This section covers the bacteria which are associated with LTTC beef burgers, general requirements for managing the risk to consumers and an overview of methods which can be used to safely produce and serve LTTC beef burgers, or beef burgers which appear to be LTTC.

The main source of bacteria in meat is from the intestines of the animal. When animals are slaughtered, there is potential for harmful bacteria from the intestines and hide to contaminate the surface of meat. There is no way of knowing which animals in the slaughterhouse are carrying harmful bacteria as the bacteria cannot be seen without a microscope.

Certain harmful bacteria, such as Salmonella and Shiga-toxin producing Escherichia coli (STEC), including Escherichia coli (E. coli) O157, are associated with raw beef. These bacteria can cause infection in very low doses which can lead to serious illness and death in some cases.

When meat is minced to produce burgers, harmful bacteria from the surface of the raw meat may be spread throughout the burger. Unless the burger is cooked to a temperature of 70°C for two minutes or equivalent, all the way through, these bacteria may survive on the inside.

Cooking burgers to a time/temperature combination of 70°C for two minutes, or equivalent, all the way through will result in a six-log reduction in bacteria and this is considered to reduce the risk of food poisoning to an acceptable level. If followed correctly, the methods of cooking and serving LTTC beef burgers, or burgers that appear to be LTTC, which are covered in this guidance should give similar levels of reductions in bacteria.

Reductions in bacteria are often expressed as log reductions to avoid using the massive numbers which are associated with micro-organisms. The table below shows how log reductions of bacteria can be expressed as percentages. For more information about log reductions please see [Annex 2](#).

Log reductions of bacteria expressed as percentages

Reduction	Percentage of bacteria eliminated
One-log	90%
Two-log	99%
Three-log	99.9%
Four-log	99.99%
Five-log	99.999%
Six-log	99.9999%

Requirement to inform LA of intention to serve LTTC beef burgers

If a food business plans to serve LTTC beef burgers, or burgers which appear to be LTTC, they are legally required to inform their LA because it constitutes a significant change to their business operation. New businesses should indicate on the registration form their intention to produce/serve LTTC beef burgers or beef burgers which appear to be LTTC.

Requirement for a Food Safety Management System

Food businesses serving LTTC beef burgers, or beef burgers which appear to be LTTC, must produce and implement an appropriate FSMS which takes into account that burgers will be LTTC, or appear to be LTTC. The FSMS must be based on [Hazard Analysis and Critical Control Points \(HACCP\)](#) and the FSA website provides further information.

This guidance summarises the requirement; it is not exhaustive, all hazards must be considered.

HACCP

The HACCP approach provides a systematic way to identify food safety hazards and make sure that they are being controlled every day.

It is a legal requirement to follow the seven principles of HACCP:

- identify any hazards that must be prevented eliminated or reduced
- identify the critical control points (CCPs) at the steps at which control is essential
- establish critical limits at CCPs
- establish procedures to monitor the CCPs
- establish corrective actions to be taken if a CCP is not under control
- establish procedures to verify whether the above procedures are working effectively
- establish documents and records to demonstrate the effective application of the above measures

Pre-requisites

Pre-requisites are effective policies and procedures that are essential for food safety and must be in force before and during the implementation of HACCP. Many pre-requisites are legal requirements. Once the pre-requisites are in place, HACCP can then be used to control steps in the food business which are critical in ensuring the preparation of safe food.

It is important that these pre-requisites are in place as without them, the HACCP based procedures for controlling hazards throughout food production will not be effective. Although not exhaustive, some examples which are particularly relevant to beef burgers which are LTTC or appear to be LTTC are:

- staff training
- cleaning and disinfection
- temperature control, which could include achieving/maintaining the cold chain and cooking/hot holding temperatures
- suitable resources and facilities
- prevention of cross contamination
- personal hygiene of staff

As part of the food safety management system, consideration should be given as to whether any of the pre-requisites would also be critical control points.

Legal requirements

The requirement to inform the LA of plans to serve LTTC beef burgers or beef burgers which appear to be LTTC can be found in:

- Article 6(2) of [retained Regulation \(EC\) No 852/2004](#) for England and Wales
- Article 6(2) of [Regulation \(EC\) No 852/2004](#) for Northern Ireland

The requirement for a HACCP-based food safety management system is included in:

- Article 5 of [retained Regulation \(EC\) No 852/2004](#) for England and Wales
- Article 5 of [Regulation \(EC\) No 852/2004](#) for Northern Ireland

Overview of methods used to cook beef burgers

Conventional thorough cooking - burgers are thoroughly cooked all the way through to a core temperature of 70°C for two minutes, or equivalent. This will generally result in a 99.9999% (six-log) reduction in harmful bacteria which may be present. This reduction in bacteria is generally considered to reduce the risk of food poisoning to an acceptable level. Examples of time/temperature combinations which are equivalent to 70°C for at least 2 minutes for cooking include:

- 80°C for at least 6 seconds
- 75°C for at least 30 seconds
- 65°C for at least 10 minutes
- 60°C for at least 45 minutes

Sous-vide cooking- burgers are vacuum packed and cooked in a water bath for a longer period and at a lower temperature than conventional cooking. A validated time/ temperature combination equivalent to 70°C for two minutes must be achieved. This will result in the burgers remaining pink in the middle while achieving a six-log reduction in bacteria. Further information can be found in [Annex 4](#) of this guidance.

Sear and shave - the outer surfaces of a whole muscle piece of beef are to be sufficiently cooked to achieve at least a six-log reduction in bacteria, as determined by the food safety management system. The outer surfaces are then shaved off and the remaining meat is minced and used to make burgers which are lightly cooked. This method of preparation will achieve a six-log reduction in bacteria while the burgers remain pink in the middle. Strict controls and additional information can be found in [Annex 5](#) of this guidance.

Source control - beef, minced beef and beef burgers are produced with strict controls in place, which research has shown can reduce bacteria by two-logs. The beef burgers are then lightly cooked to achieve at least a four-log reduction in bacteria. The infographic below (Figure 1) gives an overview of the steps to be taken at each stage of the food chain when using this method. You can also [download the Source control method infographic as a PDF](#).

Figure 1. Source control method - steps at each stage of the food chain

