

Draft guidance for consultation: Less than thoroughly cooked beef burgers

Guidance summary

Summary of the less than thoroughly cooked beef burgers guidance for food businesses and local authorities.

[Revision history](#)

Purpose

This guidance gives advice to food businesses and local authority (LA) officers on controls and safe systems which can reduce the risks associated with less than thoroughly cooked (LTTTC) beef burgers, sometimes referred to as rare, pink or lightly cooked burgers.

Legal status

This document contains regulatory guidance and best practice. Regulatory guidance specifies how food business operators can comply with legislation. Best practice is not required by law.

Who is this publication for?

This guidance is for:

- businesses serving LTTTC beef burgers
- local authority officers enforcing food hygiene official controls
- it may also be of interest to manufacturers and processors of beef, minced beef and beef burgers intended to be less than thoroughly cooked

Review date

We will review this guidance before Month 202X.

Contacts

We welcome your feedback on this guidance.

Please contact us by email at burgerenquiries@food.gov.uk

Downloading this guidance

You can:

- use the 'View as PDF' option at the top of each page to download individual pages of this guidance
- use the 'View entire guide as PDF' option placed at the bottom of each page to download the entire guidance as one document

Revision history

- **Month 2022** - Guidance amended to be easier to understand. Advice to buy minced beef and beef burgers from specifically approved premises added. Change of format from a PDF document to HTML webpages for accessibility.
- **June 2018** - Revision to consumer messaging
- **May 2016** - Original guidance published

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Introduction

An overview of different burger cooking methods, purpose of the guidance, its legal status and the intended audience.

This guidance has been produced by the Food Standards Agency (FSA), with help from key stakeholders including food businesses, trade organisations, food safety consultants and local authorities (LAs).

The FSA first produced a guidance document on less than thoroughly cooked (LTTTC) beef burgers in 2016, as it had become apparent that consumer demand for lightly cooked burgers was increasing and that businesses and LAs needed information to help them understand the necessary controls and systems. An update to the guidance in 2018 was limited to advice about consumer messaging.

When beef burgers are thoroughly cooked, achieving a temperature of 70°C for two minutes or equivalent, this will result in a 99.9999% (six log) reduction in bacteria which is generally considered to reduce the risk of food poisoning to an acceptable level. For more information about log reductions please see [Annex 3](#).

A LTTTC beef burger is a cooked beef burger which has not achieved the above time/ temperature combination, or equivalent, throughout the product. Some beef burgers appear to be less than thoroughly cooked, as they are pink in the middle, despite having been cooked to a time/ temperature combination of 70°C for two minutes, or equivalent.

If beef burgers are not cooked all the way through, there is a risk that harmful bacteria may survive and cause food poisoning. When meat is minced and burgers are formed, harmful bacteria which are normally on the outside of meat can be spread throughout the burger.

The FSA acknowledges that some consumers wish to eat LTTTC beef burgers, which are considered a greater risk than those normally consumed. This guidance aims to balance the risks to consumers with informed consumer choice.

There is no legal requirement to cook meat for a specific time or to a specific temperature and businesses can serve LTTTC beef burgers if they can demonstrate that they have controlled the risks to acceptable levels.

There are approaches that can be used for LTTC beef burgers which can provide an equivalent level of safety to thorough cooking, but strict controls and systems need to be in place. This guidance provides advice on those systems and controls.

This guidance covers two methods of serving LTTC beef burgers, namely the sear and save method and the source control method. This guidance also covers the sous vide method of cooking beef burgers which can produce burgers which appear pink in the middle despite being thoroughly cooked.

Businesses intending to serve LTTC beef burgers must inform their LA beforehand and must be able to demonstrate that suitable controls are in place. This will include a food safety management system (FSMS) that takes into account that the beef burgers will be less than thoroughly cooked.

A consumer message helps consumers understand the potential risks of eating LTTC beef burgers. The consumer message also aims to discourage consumers from eating LTTC beef burgers at home.

Businesses with a primary authority should work with them to develop suitable food safety management systems. Primary authorities may issue advice to the business to provide assurance about the system adopted but this does not affect the responsibility that the business has to comply with the law.

Intended audience

This guidance is intended for food businesses that serve LTTC beef burgers and LA officers who register and inspect such businesses.

This guidance may also be useful to businesses that supply beef, minced beef and beef burgers to be less than thoroughly cooked, and the enforcement officers who carry out official controls at these businesses.

Purpose of the guidance

This guidance is intended to help businesses and LA officers to understand the controls and systems which can be used to produce and serve LTTC beef burgers. The guidance will help businesses to achieve consumer safety and legal compliance.

The scope of this guidance is to give advice on the production and service of LTTC beef burgers and beef burgers which appear to be less than thoroughly cooked.

Burgers made from meat other than beef are not within the scope of this guidance. FSA advice is that burgers made from other meats should be thoroughly cooked.

Legal status of the guidance

This guidance has been produced to provide:

- guidance on the legal requirements relevant to the production and service of LTTC beef burgers or beef burgers which appear to be LTTC
- links to the legislation that applies, which can be found in legislation boxes at the end of each page and in [Annex 2](#)
- best practice guidance which FBOs are not required by law to follow

The guidance on legal requirements cannot cover every situation and businesses and LAs may need to consider the relevant legislation itself to see how it applies in their circumstances. Businesses with specific queries may seek advice from the relevant competent authority, which will usually be the environmental health/trading standards department of their LA.

Following this guidance will help businesses comply with the law. Businesses are not required by law to follow best practice guidance. While some aspects of the guidance are best practice, if they form part of the food safety management system (FSMS) it is essential they are followed accordingly. Guidance on best practice is identified in boxes, with a heading of 'Best practice':

Best practice

Best practice guidance is clearly identified within this document by this style of format.

This guidance document has been updated and published since the UK exited from the EU and the end of the transition period. References to EU legislation have therefore been updated to reflect Retained EU Law (REUL). **In Northern Ireland EU law continues to apply in respect to the majority of food and feed hygiene and safety law**, as listed in the Northern Ireland Protocol, and retained EU law does not apply in these circumstances. (Please note that the UK Government has set out in its Command Paper, [Northern Ireland Protocol: the way forward](#), changes to the operation of the Protocol and is [engaging with the EU on this](#).)

Retained EU Law is identified in FSA guidance using the following formats: **Retained Regulation (EU) No. XXX/XXXX** or **Regulation (EU) No. XXX/XXXX (REUL)**.

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

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.

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 are associated with raw beef, such as Salmonella and Shiga-toxin producing Escherichia coli (STEC), including Escherichia coli (E. coli) O157. STEC is of particular concern because it 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 right through, bacteria can remain on the inside.

Minced meat may be formed into a burger or into a patty. For the purpose of this guidance a burger consists of minced meat with added ingredients, while a patty consists of minced meat with less than 1% salt added. Different rules apply to minced meat (including patties) and to meat preparations (including burgers) at meat processors and during transport. In this guidance when the term burgers is used it also includes patties.

Cooking to a time/temperature combination of 70°C for two minutes will result in a six-log reduction in bacteria and this is generally considered to reduce the risk of food poisoning to an acceptable level. The methods of producing less than thoroughly cooked (LTTC) beef burgers, or beef burgers that appear to be less than thoroughly cooked, which are covered in this guidance can 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.

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 business plans to serve LTTC beef burgers, they are legally required to inform their LA beforehand because it constitutes a significant change to their business operation.

Requirement for a Food Safety Management System

Businesses serving LTTC beef burgers must produce and implement an appropriate food safety management system (FSMS) which takes into account that beef burgers will be less than thoroughly cooked. The FSMS must be based on [Hazard Analysis and Critical Control Points \(HACCP\) principles](#). This guidance summarises the requirement, it is not exhaustive, all hazards must be considered.

HACCP

HACCP is a way of managing food safety hazards and ensuring food safety which can be incorporated into the FSMS.

HACCP involves:

- looking closely at a food business, what could go wrong and food safety risks
- identifying the critical control points a business needs to focus on, to ensure risks are removed or reduced to safe levels
- deciding what action is needed if something goes wrong
- making sure procedures are being followed and are working
- keeping records to show procedures are working

Pre-requisites

Pre-requisites are basic hygiene standards which must be in place before HACCP is considered. These provide the foundation of good hygiene practice. Some examples which are particularly relevant to LTTC beef burgers are:

- suitable staff training
- suitable cleaning and disinfection procedures
- temperature control
- personal hygiene of staff

Legal requirements

The requirement to inform local authority of plans to serve less than thoroughly cooked burgers 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

Best practice

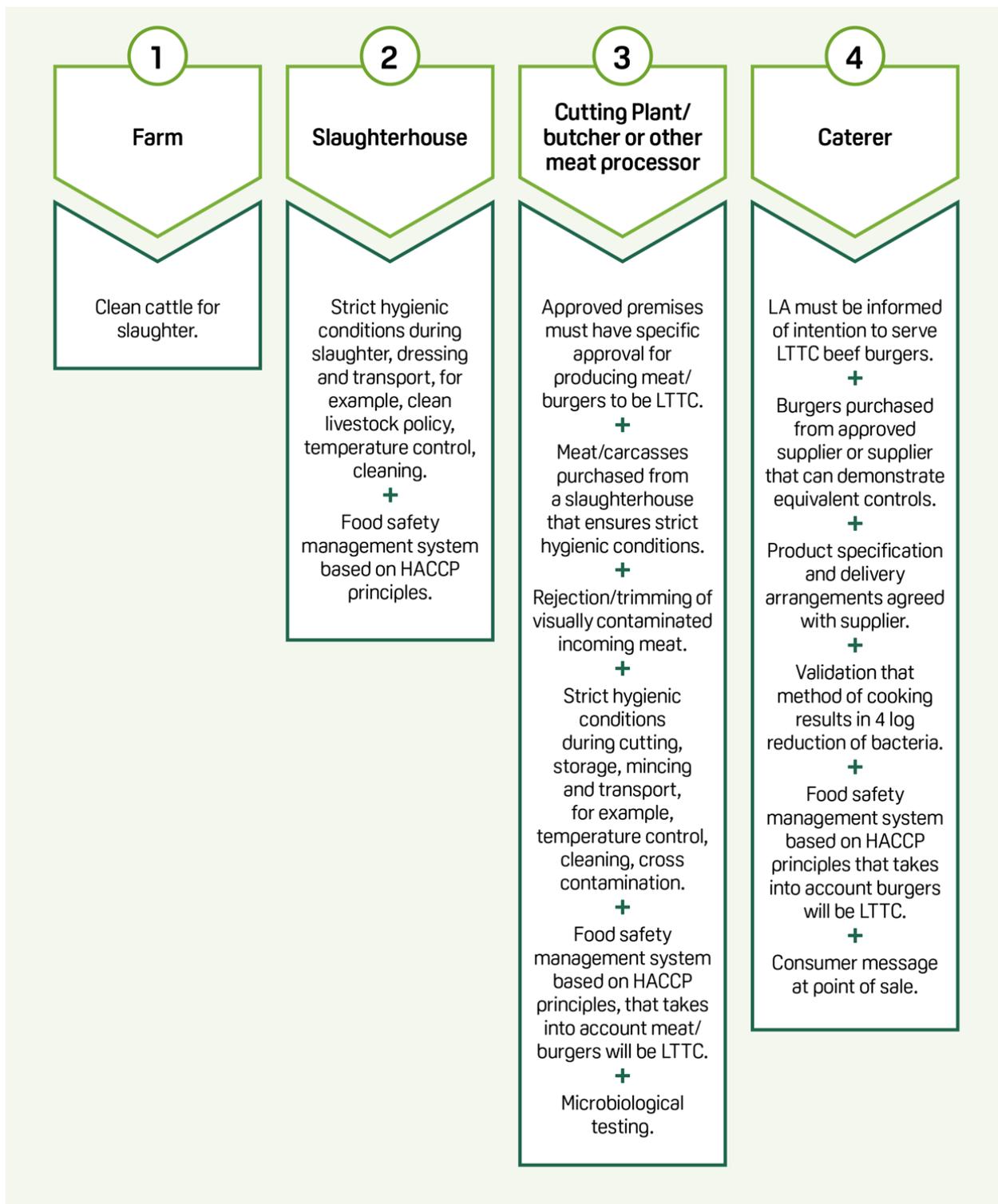
It is best practice to thoroughly cook burgers all the way through to 70°C for two minutes or equivalent, to achieve a six-log (99.9999%) reduction in bacteria.

[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 time/ temperature combination equivalent to 70°C for two minutes is achieved. This can result in beef burgers remaining pink in the middle while achieving a six-log reduction in bacteria.

[Sear and shave](#) - the outer surfaces of a piece of meat are cooked to a high enough temperature to achieve at least a six-log reduction in bacteria. The outer surfaces are then shaved off and the remaining meat is used to make burgers which are lightly cooked. This method of cooking can achieve a six-log reduction in bacteria while the beef burgers remain pink in the middle.

[Source control method](#) – beef, minced beef or beef burgers are bought from suppliers 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 (Figure 1) gives an overview of the controls 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 - controls at each stage of the food chain



We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Sous vide cooking method

What a sous vide cooking method is and how it can be used for beef burgers which appear to be less than thoroughly cooked.

Sous vide consists of placing food in a vacuum sealed bag, then cooking it in a water bath. The food is cooked for a longer time and at a lower temperature than conventionally cooked food. Beef burgers cooked this way may look pink in the middle, despite being cooked to a time/temperature combination equivalent to 70°C for two minutes. Meats are often quickly grilled or fried after the sous vide process to caramelise and/or give the browned appearance expected by the consumer.

Best practice

Businesses may wish to appoint an expert food safety consultant as sous vide is a complex process and must be carefully controlled to ensure it is safe.

The sous vide system must be validated before it is introduced to check it will work as intended. Checks must be carried out to ensure the beef burgers consistently achieve a time/ temperature combination of 70°C for two minutes or equivalent.

Handling and storage of the burgers after cooking must be hygienic. Businesses are advised to refer to the [guidance on vacuum packed foods](#) and the [E. coli cross-contamination guidance](#).

Best practice

It is best practice to provide a consumer message to explain that the business has used specific cooking methods to produce beef burgers which appear to be less than thoroughly cooked. This is to help consumers understand that cooking pink burgers at home is not recommended.

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Sear and shave method

What the sear and shave cooking method is and how it can be used for less than thoroughly cooked burgers.

This method is based on the same principle as cooking whole pieces of steak - searing the outside of the meat to kill bacteria. Whole muscle cuts of meat must be used because any harmful bacteria will be on the outer surfaces of the meat and will be reduced to safe levels.

The method has two steps:

- step one is searing - cooking the outside surface of the meat by briefly heating it to a high temperature to destroy surface bacteria, while the deeper tissues remain raw
- step two is shaving the piece of meat to remove the seared surface, leaving the uncooked meat which can be minced and formed into burgers which can be lightly cooked

The searing stage can be achieved by frying the piece of meat but blanching, boiling, deep frying or other types of cooking can also be used to heat the outside of the meat to a high temperature.

It is important that the surface of the cut of meat is not pierced, for example by using utensils to tenderise the meat. This could cause contamination to be pushed into the cut of meat, which could make the sear stage ineffective.

The combination of time and temperature applied at the searing stage must be sufficient to thoroughly cook the surface of the meat as this will reduce harmful bacteria to safe levels. A temperature of 70°C for two minutes or equivalent is generally considered to reduce the risk of

food poisoning to an acceptable level. The surface of the meat must be smooth to ensure searing is even.

The slicing/shaving must be carried out hygienically to prevent any potential for cross-contamination.

Once the outside of the meat has been seared, the meat can be minced, formed into burgers and lightly cooked.

Potential for further cross-contamination must be prevented when mincing, forming into burgers, storing and cooking. Mincers are considered to be complex equipment so a mincer which is used for raw meat to be LTTC must not also be used for other meats, unless it can be fully dismantled and disinfected between uses. This is because contamination can occur throughout the internal components of the equipment that cannot be adequately disinfected without a full dismantle. Detailed guidance on cross contamination can be found in the [E. coli cross-contamination guidance](#).

It must be remembered that any ingredients added to the minced meat to make the burger, such as raw onions or spices, will need to be suitable as they will not be thoroughly cooked.

It is best practice to use separate, designated equipment for meat which has been seared to reduce the risk of cross contamination.

It is possible to sear the outside of a whole cut of meat, and then mince the whole piece of meat without the 'shave' step to remove the cooked outer layer of meat. As with 'sear and shave', businesses must ensure that the handling, preparation and storage of the meat after the searing process is safe and hygienic.

If the process is carried out hygienically a six-log reduction in bacteria can be achieved.

Best practice

It is best practice to provide a consumer message to explain that the business has used specific controls to produce burgers that are less than thoroughly cooked. This is to help consumers understand that cooking pink burgers at home is not recommended.

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Source control method

What the source control method is and how it can be used for LTTC beef burgers.

Overview of the method

This method starts with beef/minced beef/beef burgers being bought from a supplier which has controls in place to ensure the reduction of harmful bacteria. Examples of controls include lactic acid rinsing of meat cuts, steam surface treatment, separation of storage and equipment to avoid cross contamination, and enhanced microbiological sampling. [Research has shown that appropriate source controls can result in at least a two-log reduction](#) in bacteria.

Beef burgers are then cooked to a time/temperature combination which will result in a four-log (99.99%) reduction in bacteria, so overall a six-log reduction can be achieved.

A consumer message is used to alert consumers, particularly vulnerable groups, to the increased risk of eating less than thoroughly cooked (LTTC) beef burgers.

Best practice

Businesses may wish to appoint an expert food safety consultant as this is a complex process and must be carefully controlled.

The information below lists some points to consider at each step of the source control method. More detail is given further on in the guidance.

Step 1: Purchase

- supplier specifically approved for the production of minced meat or beef burgers to be less than thoroughly cooked
- specific controls in place at suppliers (for further information see [Annex 4](#))
- supplier's food safety management system specifically takes into account that product will be LTTC
- product specification
- microbiological testing

Step 2: Delivery to caterer

- food safety intake checks
- temperature
- cross-contamination
- product must comply with specification
- 'use by' date
- malformed/misshapen burgers

Step 3: Storage

- temperature
- cross-contamination
- burgers becoming misshapen

Step 4: Preparation

- temperature
- cross-contamination

Step 5: Cooking

- validated system for reducing bacteria by at least four-logs

Step 6: Service

- consumer message

Purchase

Best practice

It is best practice to buy minced beef, beef burgers or patties from a supplier that has been specifically approved by FSA or an LA to supply products that will be less than thoroughly cooked. Approved premises which supply minced meat or burgers to be less than thoroughly cooked must have specific approval for this activity. The [list of approved less than thoroughly cooked meat establishments in the UK](#) will assist businesses with finding a suitable supplier.

There are specific hygiene standards that apply to suppliers of minced beef or beef burgers to be less than thoroughly cooked and these are summarised in [Annex 4](#).

Suppliers of minced beef or beef burgers, which will be less than thoroughly cooked using the source control method, must have appropriate procedures in place which reduce the risks associated with raw beef. Suppliers must specifically identify relevant pathogens, such as salmonella and STEC, as hazards in their food safety management system (FSMS). There must be evidence that suppliers have identified and put in place controls for these hazards and that they monitor and verify that the controls are effective on an ongoing basis. [Annex 4](#) provides further information about appropriate HACCP-based food safety management systems.

Some suppliers may be exempt from approval, in which case the catering business serving the LTTC burgers must be able to demonstrate that their supplier meets the stringent hygiene standards that would be required of a LTTC approved establishment. [Annex 4](#) provides further information about these hygiene standards and appropriate HACCP-based food safety management systems.

Best practice

It is best practice that suppliers are audited to ensure that appropriate controls are in place.

Product specification

The catering business must be able to demonstrate that appropriate product specifications are in place. Examples include:

- using cuts of meat least likely to be contaminated with pathogens of concern
- not sourcing meat from geographical areas with high levels of STEC in cattle
- making burgers a consistent shape, size and thickness, so that safety controls such as cooking times are easy to apply
- using packaging which does not squash or misshape the burgers
- using strict temperature controls and ensuring the cold chain is maintained to limit the growth of harmful bacteria
- avoiding cross-contamination at all stages

Validation and verification of the FSMS at suppliers

Sampling and testing regimes are needed to validate and verify controls as part of the FSMS. The regime must include specific corrective action that will be taken in the event of unsatisfactory results. Although sampling is not a guarantee of the safety of a product, it is an important means of verifying that the FSMS is effective.

Microbiological sampling requirements for businesses that mince meat

Microbiological sampling is required for minced meat/beef burgers that will be less than thoroughly cooked, including when the beef is minced at a catering business.

Legal requirements

The requirement for businesses to carry out sampling for minced meat/beef burgers that will be less than thoroughly cooked is included in:

- Annex 1, Chapter 1 of [retained Regulation \(EC\) No 2073/2005](#) for England and Wales
- Annex 1, Chapter 1 of [Regulation \(EC\) No 2073/2005](#) for Northern Ireland

The Regulation provides specific microbiological criteria for salmonella levels in minced meat and meat preparations to be consumed raw. These criteria also apply to minced meat and meat preparations which are to be less than thoroughly cooked, including minced meat with seasoning or additives, formed into burgers.

The catering business serving LTTC beef burgers must be able to demonstrate that this sampling has been carried out and that the results comply with the regulations.

Note: Businesses that produce minced meat or meat preparations to be less than thoroughly cooked using the source control method must always carry out sampling, regardless of volume. The exemption in the regulations for small amounts of minced meat and meat preparations does not apply.

The FSMS must also consider controls for hazards other than salmonella, including STEC. Additional verification sampling may be required, alongside the criteria in the regulations. There must be procedures in place for the appropriate corrective action to be taken if the results are unsatisfactory.

If sampling results show that STEC are confirmed as present in a batch of minced meat or meat preparations, that batch of meat must not be used for burgers that will be less than thoroughly cooked, due to the risk to public health. More [information about sampling for STEC and what to do in the event of presumptive or unsatisfactory results](#).

Delivery to caterer

Some points to consider:

- if the product is delivered above the maximum temperature limit that has been set and detailed in the FSMS, the delivery must be rejected
- the delivery must be placed into chilled storage as soon as possible, so the cold chain is not interrupted
- the 'use by' date must be checked on arrival and if it has expired, the food must be rejected
- during transport, meat or burgers to be less than thoroughly cooked should be separated from other raw meat and food, to reduce the risk of cross-contamination
- if the delivery does not meet the product specification, such as size and shape, it must be rejected
- the planned monitoring and verification checks and the proposed staff training must be validated to make sure they will achieve effective control
- delivery intake procedures must be verified on a routine basis; monitoring records and any corrective actions taken should be checked by management

Best practice

It is best practice for catering businesses to carry out microbiological sampling of uncooked minced beef or beef burgers they have received from the supplier. This is to verify they are meeting the required microbiological criteria.

Storage

Some points to consider:

- fridges must be large enough and of a suitable grade to hold the required volume of product at the correct temperature
- temperatures must be monitored using calibrated equipment and records kept
- products must be used within the supplier's specified shelf life
- minced beef or beef burgers bought in fresh must not be frozen before use, unless instructions are provided by the supplier
- products to be less than thoroughly cooked must be stored separately from other foods, including other raw meat products and ready-to-eat foods
- if the shape and size of the burgers, and/or the manner in which they are stacked or packaged, has been specified, then storage at the catering establishment must not affect this
- management must make routine verification checks of storage practices to ensure that temperatures are being monitored and recorded correctly and remain within the set limits, staff are using the designated storage areas correctly and any corrective action required is being taken and recorded
- if any deviation from the documented storage procedures is observed, the root cause of this should be determined and addressed to ensure the same issues do not recur

Best practice

It is best practice to store products to be less than thoroughly cooked in a separate, designated fridge.

Production of beef burgers by the catering business

When catering businesses make the burgers themselves, the following points need to be considered:

- the burgers must be labelled with a suitable shelf life, this date should be determined by a HACCP validation study
- burgers to be less than thoroughly cooked cannot be prepared in the same area at the same time as any other raw meats, the work surface must be thoroughly cleaned and disinfected between uses, detailed guidance on cleaning and disinfection can be found in the [E. coli cross-contamination guidance](#)
- complex equipment such as mincers must be designated for products to be less than thoroughly cooked only and other pieces of equipment, such as knives and chopping boards, must also be designated, unless they can be completely dismantled, thoroughly cleaned and heat disinfected
- designated utensils and equipment must be stored in a location where they are not at risk of contamination
- controls must be monitored as specified in the FSMS, for example, the time burgers are out of the fridge, or the temperature of burgers at the end of processing may need to be checked and recorded
- the preparation methods must be validated before they are introduced to make sure they are going to work, it may be helpful to consider the following questions:
 - Is the preparation space adequate?
 - Is the right equipment available?
 - Will safe temperatures be maintained?
- management must regularly verify that all food safety management procedures, monitoring and validation of processes are working, temperature records and corrective actions should be checked to ensure they are accurate

- microbiological testing is legally required if the caterer minces meat to be less than thoroughly cooked, and [specific legislation applies](#)
- if any deviation from the documented procedures is observed, the root cause for this should be determined to ensure the same issues do not recur

Best practice

It is best practice to:

- prepare burgers during times when the kitchen is quiet, as it is likely to be cooler and staff are less likely to be distracted by other tasks
- use separate, designated equipment and surfaces for the preparation of burgers/patties to be less than thoroughly cooked
- remove meat from the fridge only when staff are ready to mince the meat and/or form the burgers, staff should work on small batches at a time and place finished batches in the fridge before starting on another
- handle the meat as little as possible, to prevent it from becoming warm, any equipment used should not be hot, for example after being washed in a dishwasher
- use a chilled room or a cool area of the kitchen as this will help keep meat cold and if any ingredients are added to the burger they should be as cold as possible before being used, e.g. onions

Cooking

The cooking process will be a critical control point in the FSMS and critical limits must be identified. The proposed time/temperature combination must be validated to show that a four-log reduction in bacteria will be achieved. Further validation is needed to show that the proposed cooking method will consistently achieve the validated time/ temperature combination.

Validation and verification of the time/temperature combination

When validating and verifying the proposed time/temperature combination to show that it will result in a four-log reduction in bacteria, evidence may be gathered as below. The list is not exhaustive and there may be other ways to provide evidence.

Challenge testing

Challenge testing can be used to show that the cooking method will result in a four-log reduction of bacteria. Challenge testing is the deliberate addition of specific microorganisms to monitor their growth and/or survival in a product. Microbiological testing should be carried out by a laboratory accredited to ISO 17025 and the methodology used by that laboratory should also be accredited. A [list of accredited laboratories](#) can be found on the United Kingdom Accreditation Service's (UKAS) website. Laboratories will be able to advise on tests in further detail.

Scientific data

It may be possible to use existing scientific and/or technical data to support validation and challenge testing. For example, some businesses will have a number of identical establishments, equipment and products. It may be that a validation for one establishment is suitable for the other establishments.

It may also be possible to use wider industry validation data if methods are similar. In this situation, it would be important to consider factors such as:

- time and temperature
- ingredients
- fat content
- uniformity of composition
- the size and shape of the burger
- the heating method

Modelling

Potentially, mathematical modelling could be used to support validation and challenge testing. There must be sufficient data to predict the effects of different treatments. Factors such as size, ingredients and the expected level of contamination must be considered.

Note: If changes are introduced to the method or product specification, for example a new piece of equipment is provided, or a new supplier or product specification is used, then the process must be re-validated.

Verification sampling

Microbiological sampling after cooking can be used to verify that the system in place is working as intended. When planning a sampling regime, the following matters may need to be considered:

- quantity of LTTC beef burgers served
- controls in place
- purpose of the sampling regime
- pathogens being tested for
- against what parameters the final sample results will be compared
- sample size to be tested each time
- frequency of sampling

It is important to recognise the limitations of sampling. For example, a result that reports the absence of STEC does not necessarily verify that all the burgers are free from STEC. If STEC was not present in the burger that was sampled before cooking, it will not be present after cooking, regardless of the controls in place.

Validation and verification of the cooking method

The cooking method must be validated before it is introduced to show that the proposed time/temperature will be achieved consistently. Once the cooking method has been validated and it is introduced, businesses must verify that the time/temperature combination is being met consistently.

Temperature checks

Points to consider for temperature checks:

- the temperature at the centre of the burger will need to be tested, as this is likely to be the last part of the burger to reach the required temperature
- the type of probe thermometer used must be suitable and instructions must be followed, it must be calibrated according to instructions to ensure it gives an accurate reading
- the probe thermometer must be cleaned and disinfected before and after each use to reduce the risk of cross contamination
- temperature monitoring records should be kept demonstrating that this CCP is under control, in accordance with the FSMS

- monitoring records should be verified by management, in accordance with the FSMS
- the method used to check burger temperatures should be verified on a regular basis by observation, in accordance with the FSMS
- staff must be able to be identified and retrained if management identify any issues with records
- verification checks should be recorded along with any corrective actions taken, in accordance with the FSMS

Cooking time check

The validated cooking method may entail burgers being cooked for a certain amount of time to achieve the time/temperature combination. Various factors need to be considered when using time checks:

- the type and temperature of equipment used - different grills and flat tops operate in different ways and some will have cold spots that will affect cooking time
- the number of burgers cooked together may affect cooking time
- heat will distribute at different rates through burgers with different thicknesses, fat content and ingredients
- the temperature of the burger before cooking - a burger removed from the fridge at 1°C will take longer to heat to core temperature than a burger at 5°C, the ambient temperature of the kitchen may also affect cooking time
- if timers are used to monitor the time taken to cook burgers, the number of timers needed will depend on the number of burgers to be cooked at the same time and whether every burger is timed, a maximum cook load may need to be set

Validation of cooking time

If the cooking time is used to assess whether the beef burgers are cooked to an appropriate time/temperature combination, this system must be validated before it is introduced. This would involve checking that the correct temperature of the burger has been achieved after it has been cooked for the set time.

If anything changes which may affect the cooking time, such as the cooking equipment or the supplier of the burgers, the method must be validated again.

Verification of cooking time

It is important that the time taken to reach the required time/temperature is verified regularly. To verify that an adequate time/temperature has been achieved, a burger must be cooked for the set time. Then the core temperature must be checked. If cold spots on the cooking plate/grill have been identified, the verification must be carried out in the known cold spot.

Consideration must also be given as to how the above process will be recorded.

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Consumer message

Requirement for telling consumers about the risk of eating less than thoroughly cooked burgers

A consumer message is required to alert consumers, particularly vulnerable groups, to the increased risk of eating less than thoroughly cooked (LTTC) beef burgers.

Although there is no specific legal requirement for the labelling of LTTC burgers, legislation says that, when considering whether food is unsafe (or safe), food businesses should have regard to information provided to consumers, and in particular to those consumers in vulnerable groups.

Legal requirements

This legal requirement can be found in:

- [Article 14 of retained Regulation 178/2002](#) for England and Wales
- [Article 14 of Regulation 178/2002](#) for Northern Ireland

A relevant extract from the legislation can be found below:

'In determining whether any food is unsafe, regard shall be had:

... to the information provided to the consumer, including information on the label, or other information generally available to the consumer concerning the avoidance of specific adverse health effects from a particular food or category of foods

And

... In determining whether any food is injurious to health, regard shall be had:

... to the particular health sensitivities of a specific category of consumers where the food is intended for that category of consumers'

When a food carries a level of risk that is deemed as elevated but still within acceptable levels of risk, and that risk is not communicated to consumers to allow them to consider that before they order it, this could be considered as not fully compliant with general food law.

The FSA conducted consumer focussed [research on the effectiveness of consumer advisory messages at the point of ordering](#), which was published in July 2016. The findings of the research were taken into consideration, along with comments from LAs and industry stakeholders, to develop the wording for consumer messages. Messages should be clear, meaningful and easily understood. The best practice box below contains the recommended consumer message to be used when LTTC beef burgers have been produced using the source control method.

Best practice

The FSA recommends using the following consumer message:

'Burgers cooked rare and medium rare carry a higher risk of food poisoning. Unlike a steak, a burger needs to be cooked through to reduce that risk.

The Food Standards Agency recommends that children, pregnant women and anyone with a weaker immune system have their burgers well done. Please ask us for more information.'

It is best practice that the consumer advisory message is easily visible, clearly legible and considers the needs of those with impairments. It is recommended the message is in the same section(s) of the menu in which burgers are listed and not obscured in any way.

Annex 1 - Glossary

Glossary of terms used in the guidance.

A

Approved establishment

Many wholesale food businesses which produce and supply food of animal origin, such as slaughter houses and cutting plants, require approval under Regulation EC (No.) 853/2004 by either the LA or the FSA, depending on the type of establishment. If an approved establishment is producing minced beef or burgers which are to be less than thoroughly cooked, they must be specifically approved to supply these products.

B

Bacterial count

Number of bacterial cells.

Burger

For the purpose of this guidance, a meat preparation consisting of minced beef and additional ingredients. In this guidance the term burger also covers patty, which is minced beef which has been formed into a burger shape to which less than 1% salt has been added.

C

Carcass

The body of an animal after slaughter and dressing.

Caterer or catering business

A food business directly preparing, cooking and supplying food to the final consumer such as restaurants, burger outlets and pubs.

Challenge testing

The deliberate addition of specific microorganisms to monitor their growth and/or survival in a product.

Competent Authority (CA)

An authority to which the Central Competent Authority (CCA) has delegated competence (local authorities).

Critical Control Point (CCP)

Step that can be achieved to prevent, eliminate or reduce a hazard to an acceptable level.

Critical limit

The measurement that is acceptable for product safety (for example, temperature or time).

E

Escherichia coli (E. coli)

A type of bacteria common in human and animal intestines. A few types can cause serious illness and it is usually spread by inadequate cooking or cross contamination.

F

Food business operator (FBO)

The natural or legal person responsible for ensuring that the requirements of food law are met within the food business under their control.

Food Safety Management System (FSMS)

A systematic approach to controlling food safety hazards within a food business to ensure that the food produced is safe to eat.

H

HACCP

Hazard Analysis Critical Control Point (HACCP) is a way of managing food safety hazards. Food safety management systems should be based on HACCP principles.

Hazard

Something which may cause harm. Food safety hazards can be biological, chemical or physical.

L

Less than thoroughly cooked beef burger

A cooked beef burger which has not achieved the time/ temperature combination of 70°C for two minutes, or equivalent all the way through.

Logarithmic reduction (log reduction)

For the purpose of this guidance, log reduction is a way of measuring the decrease in bacterial numbers due to some treatment, such as a cooking procedure. A detailed explanation on how log reduction works is available in [Annex 3](#).

M

Meat preparation

Fresh meat, including meat that has been reduced to fragments, which has had foodstuffs, seasonings or additives added to it, or fresh meat which has undergone processes insufficient to modify the internal muscle fibre structure of the meat and thus to eliminate the characteristics of fresh meat.

Minced meat

Boned meat that has been minced into fragments and contains less than 1% salt.

Monitoring

A pre arranged programme of checks (observations or measurements) of critical and/or 'legal' limits to check whether control measures are in danger of failing, and which determine the need to take corrective actions.

P

Pathogen

Microorganism that causes disease.

Patty

For the purpose of this guidance, it is boned meat that has been minced or otherwise reduced into fragments, compressed and given a flat shape and contains less than 1% salt. When the term beef burger or burger is used in this guidance it would include patties.

Primary authority (PA)

A legal partnership that a business forms with one local authority, which then provides assured and tailored advice on complying with environmental health, trading standards or fire safety regulations that other local regulators must respect.

Probe thermometer

Thermometer designed to be inserted into food to test core/internal temperature.

R

Raw

Product that has not been subjected to any cooking.

Rare

Product subjected to some cooking, but where part of the product will not reach a sufficient temperature or is not cooked for a sufficient time to cook the product throughout.

Ready to eat food

Ready to eat food is food that will not be cooked or reheated before serving. This includes salads, cooked meats, smoked fish, desserts, sandwiches, cheese and food that has been cooked in advance to serve cold.

Risk

The chance of somebody being harmed by a hazard, and how serious the harm could be.

S

Salmonella

A group of bacteria commonly found in human and animal intestines. It can cause food poisoning and is usually spread by inadequate cooking or cross contamination.

Sear and shave

The outside surfaces of whole muscle cuts of meat are briefly heated to a high temperature (seared), while leaving inner parts uncooked. The seared surfaces are then hygienically removed leaving the (raw) inner tissues to be used in the production of raw/rare products.

Slaughterhouse

An establishment used for slaughtering and dressing animals, the meat of which is intended for human consumption.

Sous vide

French term meaning “under vacuum”. This is low temperature cooking where the food is sealed in a gas impermeable bag under a vacuum. The food is then cooked in the bag (usually in a water bath) for a defined time at a defined temperature.

Steam surface treatment

Treatment applied to carcasses which involves the use of steam at a specific temperature for a minimum time period to reduce the potential microbial load on the surface.

Steam vacuum

The use of hot water or steam to loosen visible contamination from meat carcasses and destroy certain bacteria, followed by the application of a vacuum to remove contaminants.

STEC

Shiga toxin producing Escherichia coli

T

Thorough cooking

Cooking process where a burger is cooked to 70°C for two minutes, or an equivalent time/temperature combination.

V

Validation

Confirmation, before implementation, that all elements of a specific plan or control measure are fit for purpose and should have the intended effect.

Verification

Checking, by examination and the consideration of objective evidence, whether specified requirements have been fulfilled, for example, checking and confirming that the HACCP based procedures are achieving the intended effect (controlling food safety hazards). This is conducted after implementation of a specific requirement plan or control measure.

Vulnerable groups

For the purpose of this guidance, these are the following population groups: children, the elderly, immunocompromised people and pregnant women.

W

Whole muscle cut of meat

Whole cuts or joints of meat that have not been minced, chopped or rolled.

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Annex 2 - Relevant legislation and guidance

Links to legislation and guidance related to less than thoroughly cooked burgers.

Legislation

GB-wide legislation

- [The General Food Regulations 2004](#)

England and Wales

Retained EU legislation

- [Retained EU Law Commission Implementing Regulation \(EU\) 2019/627](#)
- [Retained EU Law Regulation \(EU\) No 2017/625 on official controls](#)
- [Retained EU Law Regulation \(EC\) No 178/2002 on general principles and requirements of food law](#)
- [Retained EU Law Regulation \(EC\) No 852/2004 on the hygiene of foodstuffs](#)
- [Retained EU Law Regulation \(EC\) No 853/2004 laying down specific hygiene rules for products of animal origin](#)
- [Retained EU Law Regulation \(EC\) No 2073/2005 on microbiological criteria for foodstuffs](#)

England

Domestic legislation

- [The Food Safety and Hygiene \(England\) Regulations 2013](#)
- [The Food Information Regulations 2014](#)

Wales

Domestic legislation

- [The Food Hygiene \(Wales\) Regulations 2006](#)
- [The Food Information \(Wales\) Regulations 2014](#)

Northern Ireland

EU legislation

- [EU Law Commission Implementing Regulation \(EU\) 2019/627](#)
- [EU Law Regulation \(EU\) No 2017/625 on official controls](#)
- [EU Law Regulation \(EC\) No 178/2002 on general principles and requirements of food law](#)
- [EU Law Regulation \(EC\) No 852/2004 on the hygiene of foodstuffs](#)
- [EU Law Regulation \(EC\) No 853/2004 laying down specific hygiene rules for products of animal origin](#)
- [EU Law Regulation \(EC\) No 2073/2005 on microbiological criteria for foodstuffs](#)

Northern Ireland

Domestic legislation

- [The General Food Regulations \(Northern Ireland\) 2004](#)
- [The Food Hygiene Regulations \(Northern Ireland\) 2006](#)
- [The Food Information Regulations \(Northern Ireland\) 2014](#)

Business guidance

- [E. coli cross-contamination guidance](#)
 - [Clean livestock guide](#)
 - [Clean beef cattle for slaughter – a guide for producers](#)
 - [HACCP](#)
 - Industry Guide to Good Hygiene Practice Catering Guide (UKHospitality, not currently online)
 - [Manual of Official Controls](#)
 - [Good washing hands technique \(World Health Organization\)](#)
-

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Annex 3 - Logarithmic reduction

Overview of logarithmic reduction in bacterial count.

For the purpose of this guidance, logarithmic (log) reduction is a way of measuring the decrease in the number of bacteria (bacterial count) after some treatment, e.g. cooking.

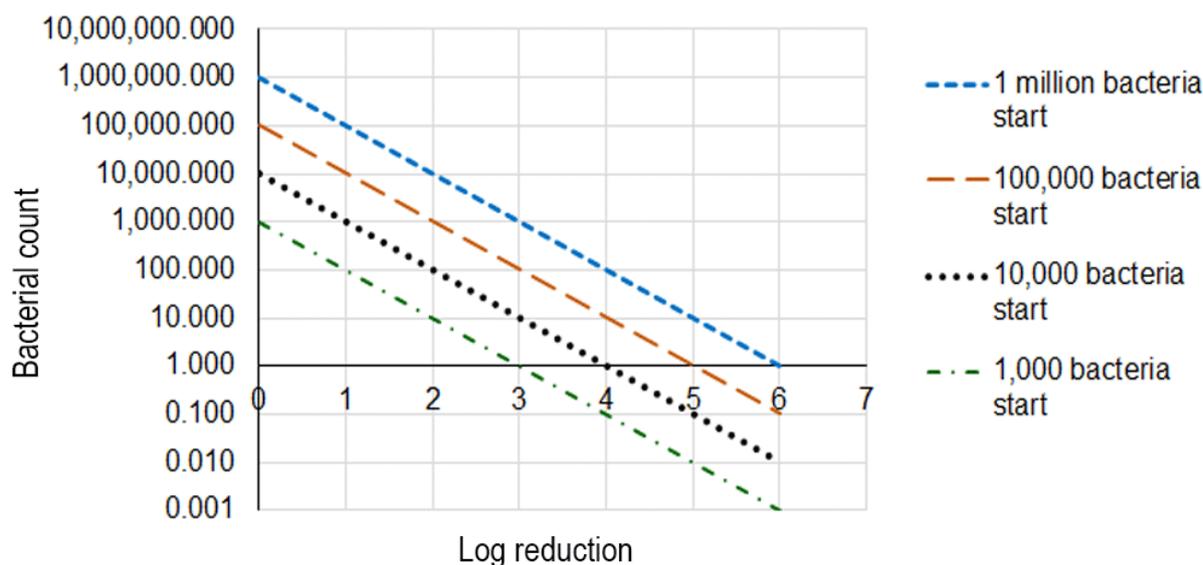
A one-log reduction means that the number of bacteria (bacterial count) has been reduced by 90%. If the meat originally has 1,000 bacteria before cooking, after a one-log-reduction cooking method, the meat will still have 100 bacteria left. A two-log-reduction cooking method would decrease bacterial count by 99%, that is, 10 bacteria left. In contrast, a six-log-reduction cooking method would decrease the bacterial count by 99.9999%, that is, the meat would have between one and zero bacteria.

Log reduction is a mathematical concept. Therefore, the bacterial count will never be described as an 'absolute zero', but as a decimal instead. The smaller the decimal, the less likely it will be for the meat to have any bacteria left after cooking.

If the bacterial count of the meat used is very high (for example, one million), a four-log reduction would decrease the bacterial count to 100, whereas a six-log reduction would decrease the bacterial count to one; not all bacteria would be eliminated. This illustrates the importance of all controls through the food chain, including at supplier level as detailed in [Annex 4](#).

'Figure 1' illustrates the effect of log reduction in bacterial count as explained in previous paragraphs.

Figure 1. Effect of log reduction in bacterial count



We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

Annex 4 - Controls at supplier level

Control measures that suppliers of minced beef or burgers to be less than thoroughly cooked burgers must implement.

Businesses serving less than thoroughly cooked (LTTC) beef burgers must ensure that their suppliers have hygienic procedures in place during slaughter, cutting, mincing and any other relevant process. Their procedures must focus on minimising contamination with pathogens.

Information about reducing potential contamination during slaughter, cutting and manufacturing of minced meat and beef burgers or patties is available in the [Manual for Official Controls \(MOC\)](#) and the FSA [Clean Livestock Guide](#). The FSA has also published [research to assess the significance of intervention methods to reduce the microbiological load on beef through primary production](#).

The key aspects of the MOC and the FSA Clean Livestock Guide are highlighted in this section, further details can be found in the original documents.

Clean beef cattle for slaughter

It is important that cattle presented for slaughter are clean and dry. This is because faeces and mud on the animal's hide can contaminate meat or the environment of a slaughterhouse when the hide is removed. Further information can be found in the [Clean beef cattle for slaughter](#) guidance.

Hygiene during evisceration and skinning/hide removal

Most of the harmful bacteria in an animal can be found in the intestines and on the hide. The intestines must be removed carefully to avoid the contents being released and contaminating the carcass during the evisceration process. Similarly, the hide of the animal must be removed carefully to avoid contamination.

Steam vacuum can be used to remove minor visible contamination, dirt and hair from the surface of the carcass prior to post-mortem inspection. This must only be used to rectify accidental contamination of carcasses and not as a substitute for good hygiene or inadequate dressing practices.

Surface treatments of the carcass

Suppliers may wish to apply treatments to the surface of the meat that reduce levels of contamination, prior to supplying it to catering establishments. Care must be taken to prevent re contamination after treatment, such as hygienic handling and dedicated mincing equipment.

Any surface treatment used must be legally allowed and the requirements in the relevant legislation must be followed. At present, lactic acid and potable water are the only substances that can be used to reduce the contamination on the surface of beef carcasses in approved slaughterhouses.

Further information on the use of lactic acid to reduce microbiological surface contamination on bovine carcasses can be found in the [Manual for Official Controls](#).

Time limits on meat to be minced

Meat must be minced within a specific time period from the time of slaughter to minimise the potential for the growth of pathogens that might be present on the meat. In the case of beef minced meat produced from chilled meat, this is:

- within no more than six days of slaughter, or
- within no more than 15 days from the date of slaughter of the animals in the case of boned, vacuum-packed beef

Temperature control

Where possible, mincing should be carried out under temperature control to keep the meat and resulting minced meat at a temperature as low as is practical. As the presence of low numbers of harmful *E. coli* can cause illness, limiting growth of the bacteria by using low temperatures as a control throughout the mincing process and other processing, handling and storage, is an important safety control. This is because if the temperature rises, the bacteria will grow faster and, if it is present in higher numbers, there is a greater likelihood of the bacteria causing illness.

Strict temperature control during any handling, storage and transport will also limit the potential for growth of harmful bacteria.

Temperature control should be reflected in HACCP-based procedures throughout the supply chain to control the hazards of concern and these should be maintained throughout distribution and storage.

Separation to prevent cross-contamination

The separation of food and equipment, where appropriate, will help to prevent cross-contamination. This includes separation of meat destined to be LTTC from meat which is not, including during preparation, storage, packing and transport. The separation of equipment for use with meat destined to be LTTC and meat that is not will also help to prevent cross-contamination. Strict cleaning and disinfection procedures of equipment, tools and premises must be in place to prevent the build-up of bacteria.

Personal hygiene for food handlers

Slaughterhouses and meat processing establishments must ensure food handlers follow good hygiene practices such as regular, effective handwashing and wearing appropriate protective clothing. This is to minimise the risk of food handlers spreading bacteria.

Documentation

Suppliers must produce and implement a written HACCP-based FSMS which includes information about how the risks associated with LTTC beef burgers are controlled. Suppliers must specifically identify Salmonella and Shiga-toxin producing E. coli (STEC), and any other relevant pathogens, as particular hazards.

Legal requirements

The requirement to mince meat within specific times is included in:

- Annex III, Section V, Chapter III 2(b) (i) of retained [Regulation \(EC\) No 853/2004](#) for England and Wales
- Annex III, Section V, Chapter III 2(b) (i) of [Regulation \(EC\) No 853/2004](#) for Northern Ireland

The requirement to produce and implement a written HACCP-based food safety management system can be found in:

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

We are consulting on this draft guidance. Take part in our [burgers guidance consultation](#).

[Back to top](#)