



The safe production of beef burgers in catering establishments: advice for food business operators and LA officers

May 2016

(Revision to Annex B – Consumer Messaging June 2018)

Summary

Intended audience:	<ul style="list-style-type: none"> • Restaurants and caterers • Local Authorities <ul style="list-style-type: none"> ○ Also of interest to manufacturers and processors
Which UK nations does this cover?	England, Wales and Northern Ireland.
Purpose:	<p>This advice is intended to help food business operators, their primary authority partners and local authorities to understand the controls and systems that can be put in place to manage the risks from the service of burgers that are less than thoroughly cooked.</p> <p>The advice relates to burgers made using beef. Burgers made using pork, chicken and other meats are beyond the scope of this document. Existing FSA advice that burgers made from other meats should be thoroughly cooked remains the same (see background)</p>
Legal status:	This document contains advice on best practice in order to comply with domestic and EU legislation
Key words	<ul style="list-style-type: none"> • Food law, monitoring and controls • Hygiene and food safety • Labelling, composition and lot marking of food • Meat and livestock
Review date	May 2017 (Revision to Annex B – Consumer Messaging June 2018)

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Executive summary

Long standing advice from the FSA, based on recommendations from the Advisory Committee on the Microbiological Safety of Food (ACMSF), is that beef burgers should always be thoroughly cooked all the way through, reaching a temperature of 70°C for 2 minutes or equivalent in the middle of the burger. This advice is in place because although contamination of whole cuts of beef tends to be on the outside of meat, the slicing/chopping/mincing of raw meat will spread any bacteria present on the surface of the meat throughout the resulting minced products such as burgers. If harmful bacteria are present in the middle of the burger and that part of the burger is not cooked, bacteria may survive and be able to cause illness.

However, the time and temperature for cooking is not specifically a legal requirement and food businesses can serve burgers that are either pink in the middle and/or are not thoroughly cooked all the way through provided that they can demonstrate that they have controlled the risks in other ways as part of their HACCP-based procedures. This can be achieved in a number of ways:

- Cooking to a lower temperature for longer - meaning the burgers remains pink but the centre reaches a temperature equivalent to 70°C for 2 minutes
- Searing the outside of meat to destroy contamination prior to mincing meat and forming it in to burger patties
- Use of novel techniques including lactic acid in slaughterhouses to reduce surface contamination of meat, use of sous vide cooking, and use of high pressure processing
- Putting in place controls throughout the supply chain to reduce and/or minimise contamination of meat, followed by less thorough cooking, but still cooking to a core temperature which can be demonstrated to achieve a significant reduction in the final product¹

This advice provides more details on the updated FSA position on the service of burgers that are less than thoroughly cooked and those that appear to be less than thoroughly cooked. It details how the different options described in this summary can be applied by food businesses and the role that Local Authorities will play in verifying that the HACCP-based controls and procedures put in place are appropriate.

¹ A significant reduction in this case is a 4-log reduction or greater which is equal to 99.99% reduction in bacteria. See section on “understanding the hazards” for more details.

1. Introduction

1.1 Intended audience

- 1.1.1 This advice is principally intended for food business operators (FBOs) in catering and restaurant settings who wish to serve burgers less than thoroughly cooked and to Local Authority (LA) officers who register and inspect such establishments. The advice includes best practice advice for serving burgers less than thoroughly cooked. For the purposes of this document, catering settings refer to any establishment directly preparing, cooking and supplying food to the final consumer such as restaurants, burger outlets and pubs.
- 1.1.2 This advice may also be useful to those FBOs who supply meat to catering establishments who will serve burgers that are less than thoroughly cooked, and the Competent Authority Officers who register, approve and inspect them.

1.2 Purpose

- 1.2.1 This advice is intended to help FBOs and LAs to understand the controls and systems that can be put in place to serve burgers, including those that will be less than thoroughly cooked.
- 1.2.2 The advice on the potential approaches and controls for burgers less than thoroughly cooked supersedes the advice in the ENF letters to LAs in 2015; however, LAs may still find features of these letters useful with regard to enforcement advice, if needed. With this in mind the advice on enforcement from those letters has been consolidated into a note to LAs on enforcement. See “other guidance” section for more details of other useful guidance and relevant links.
- 1.2.3 The advice relates to burgers made using beef. Burgers made using lamb, pork, chicken and other meats are beyond the scope of this advice.

1.3 Legal status of advice

- 1.3.1 These notes have been produced to provide good practice advice about the safe production of less than thoroughly cooked burgers in catering settings and to explain the legal requirements of the general food law² in particular Article 14 of Regulation 178/2002; and the food hygiene regulations, in particular Articles 5 and 6 of Regulation (EC) No 852/2004³. They cannot cover every situation and you may need to consider the relevant legislation

² Regulation (EC) No 178/2002 <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02002R0178-20140630&qid=1447761161291&from=EN>

³ Regulation (EC) No 852/2004 <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02004R0852-20090420&qid=1447761086483&from=EN>

itself to see how it applies in your circumstances. You are not required by law to follow this good practice advice, but if you do follow the advisory notes they will help you to comply with the law. Businesses with specific queries may wish to seek the advice of their local enforcement agency, which will usually be the environmental health department/trading standards of the local authority. FBOs with a primary authority partner should work with them to develop HACCP-based food safety management systems that comply with the law. Primary Authority Advice may be issued by the primary authority to the FBO to provide assurance about the food safety system adopted. Primary Authority Advice does not affect the responsibility that a business has to comply with legal requirements, but supports it in meeting its obligations by:

- Helping it to understand what needs to be done to achieve and maintain compliance;
- Setting out a way of achieving and maintaining compliance;
- Providing confirmation that the method of compliance chosen by the business is acceptable

1.3.2 All enforcing authorities that regulate a business in primary authority must be aware of the legal obligations placed upon them in relation to their interactions with the business, by the Regulatory Enforcement and Sanctions Act. Enforcing Authority officers should also register as a user of the Primary Authority Register to obtain the information that they will need in advance of any inspection or when otherwise regulating the business.

1.4 Background

1.4.1 Current FSA advice to both consumers and businesses on cooking burgers, which takes account of previous advice from the Advisory Committee on the Microbiological Safety of Food (ACMSF)⁴ continues to be that the potential risk associated with minced products such as burgers means that the safest approach is to thoroughly cook them all the way through, to ensure a 6-log reduction in harmful bacteria⁵. A 6-log reduction is equivalent to killing 99.9999% of the harmful bacteria initially present in present in food

1.4.2 There are approaches which can be used which give burgers the appearance of being less than thoroughly cooked (i.e. they contain pink meat in the middle), but which are equivalent to normal thorough cooking to 70°C for 2 minutes or 6-log reduction. This includes approaches such as sous-vide cooking of burgers

⁴ ACMSF report on the safe cooking of burgers:

<http://acmsf.food.gov.uk/sites/default/files/multimedia/pdfs/acmsfburgers0807.pdf>

⁵A 6-log reduction is equivalent to killing 99.9999% of the bacteria initially present.

(usually followed by conventional cooking to add colour and texture expected from a burger) and approaches such as “sear and shave”

- 1.4.3 However, this degree of reduction in bacterial load is not specifically a legal requirement. The law requires that any FBO including those wishing to serve less than thoroughly cooked burgers must have safe procedures in place, based on HACCP principles, which effectively control the risks. Thorough cooking is one means of effectively controlling risks posed by burgers and similar products. This advice looks at other approaches to controlling the risks associated with these products.
- 1.4.4 Existing FSA advice on thorough cooking applies to burgers made from meat other than beef; i.e. that they should be thoroughly cooked all the way through⁶.

1.5 Understanding the hazards

- 1.5.1 This advice focuses on procedures that can control the key microbiological hazards that can be associated with raw beef. These hazards include *E. coli* O157 and other STEC (Shiga-toxin producing *E. coli*) and *Salmonella*.
- 1.5.2 *E. coli* O157 and other STEC are of particular concern because although uncommon, they can have a low infectious dose and can cause serious, untreatable illness and lead to death in some cases. Even after recovery from infection, some people are left with permanent kidney or brain damage. Special attention should always be regarded to vulnerable groups, such as young children, the elderly, pregnant women and those with weakened immune systems.
- 1.5.3 The main source of *E. coli* is the intestines of cattle⁷. When cattle are slaughtered there is the potential for *E. coli* O157 and other pathogens from the animal’s gut and hide to contaminate the carcasses during the slaughter and preparation of the meat.
- 1.5.4 Contamination of whole cuts of beef therefore tends to be only on the outside of meat, so searing the outside and leaving the middle rare or cooked to preference is safe practice. However, the slicing/chopping/mincing (comminution) of larger cuts of raw meat will spread any bacteria present on the surface of the meat throughout the resulting minced products such as burgers. If harmful bacteria are present in the middle of the burger and that part of the burger is not thoroughly cooked, bacteria may survive and be able to cause illness

⁶ <http://www.nhs.uk/Livewell/homehygiene/Pages/Foodhygiene.aspx>

⁷ And other ruminant animals such as sheep; however meat from other animals is not in the scope of this advice.

Note on log reductions

1.5.5 Cooking times and temperatures for food that must be cooked to ensure it is safe to eat need to be able to reduce any contamination with bacteria that might be present to safe levels. 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, or a 99.9999% reduction, is typically used in cooking to make sure that even if the number of harmful bacteria contaminating food is high, this level of cooking will still mean the food is safe.

1.6 Burgers served less than thoroughly cooked The service of burgers which are not thoroughly cooked is only acceptable when there are controls in place which involve:

- Steps throughout the supply chain to minimise and/or reduce the risk of contamination of meat used to make burgers and
- A process or processes which achieve a minimum reduction of bacteria of 4-log (equivalent to killing 99.99% bacteria) and
- Messages that inform consumers regarding the potential risks from burgers that are not thoroughly cooked

1.6.2 The FBO must demonstrate to LAs and/or their primary authority that procedures are in place which reduce and/or minimise the risk throughout the supply chain and validated procedures are in place to reduce the bacteria by a minimum of 4-log before the burger is served to the final consumer.

1.6.3 FBOs serving burgers less than thoroughly cooked must ensure that the HACCP-based procedures throughout the supply chain are appropriate and their systems include the three following main principles:

- **Controls at suppliers** through the sourcing of meat only from establishments which have controls in place as part of their HACCP-based procedures which take into account that the meat will not be thoroughly cooked. Depending on the range of controls put in place, this might include controls through the supply chain from slaughterhouse onwards. FBOs producing and supplying meat should have verification procedures including appropriate sampling in place that can be used to verify that HACCP-based controls are effective.
- **Risk and hazard management** in which any validated control(s) in either the catering or supplier establishments (such as steam treatment or searing), together with cooking are sufficient to achieve a combined reduction of at least 4-log in pathogens and
- **Consumer protection**, through the adoption of an appropriate consumer advisory statement at the point of ordering food, for example on menus, to ensure that consumers and in particular those in

vulnerable groups are aware of the potential risk and the practice that children should only be served burgers which are thoroughly cooked.

- 1.6.4 The FSA advises that people in vulnerable groups should avoid burgers that are not thoroughly cooked. This includes children, the elderly, pregnant women and those who have a weakened immune system. The FSA view is therefore that burgers that are less than thoroughly cooked should not be served to children and there should be information to other potentially vulnerable people about the risks before they order a burger to ensure they can make an informed choice (see **Annex B** on messages to consumers).

Requirement for FBOs to notify LAs prior to serving burgers less than thoroughly cooked and changes to HACCP-based procedures

- 1.6.5 Food hygiene legislation requires FBOs to make sure that their competent authority (CA - this will be the LA or the FSA, depending on the nature of the business) always has up to date and accurate information about their food business and to notify the CA of any significant changes to the business⁸.
- 1.6.6 For new FBOs who intend to serve less than thoroughly cooked burgers and FBOs who are already operating but wish to start serving burgers less than thoroughly cooked, this means notifying their LA before they commence this activity in line with these requirements in food hygiene legislation. This will allow LAs to assess the FBO's proposed HACCP-based procedures and discuss with them as appropriate. For existing FBOs, LAs must be notified of significant changes to HACCP-based procedures so that they can assess the procedures that are proposed when moving from only cooking burgers thoroughly to serving them less than thoroughly cooked or where the HACCP-based approach to preparing and serving burgers changes significantly. Those FBOs with a primary authority partner will work with them to develop and implement HACCP-based food safety systems and Primary Authority Advice may be issued by the primary authority to provide assurance. LAs (enforcing authorities) must be aware of the legal obligations placed upon them by the primary authority scheme, particularly in relation to the requirements of an Inspection Plan and Primary Authority Advice. See page 8.
- 1.6.7 For those FBOs already operating and serving burgers less than thoroughly cooked, LAs (and primary authorities) should already have had opportunity to discuss HACCP-based procedures; however, it is important that where there are any significant changes to the HACCP-based procedures, the LA and primary authority must be notified.

⁸ Article 6 (2) of Regulation (EC) No 853/2004 requires FBOs to ensure LAs have up-to-date information on establishments, including by notifying any significant change in activities. Serving less than thoroughly cooked burgers is considered higher risk and would require material changes to the HACCP-based procedures in place for existing FBOs. This should be considered as a significant change in activities.

- 1.6.8 For those FBOs using validated and verified time and temperature combinations described in the ACMSF report, which then choose to use a different equivalent time and temperature to produce burgers which are thoroughly cooked but appear less than well done, there should be no requirement to notify the LA. However if there are other significant changes to the HACCP-based approach, the LA must be notified.

2. Overview of examples of FBO control systems for production of beef burgers

2.1 Summary

- 2.1.1 The responsibility for ensuring that food is safe and the requirements in general food law and food hygiene legislation are met lies with the FBO. FBOs must be able to provide evidence to demonstrate that the proposed HACCP-based procedures and controls are appropriate to reduce the risks to an acceptable level. A process of validation by the FBO should therefore be carried out to ensure that the proposed control systems and procedures are effective in terms of controlling the hazards identified. See **Annex A** for details of approaches to validation which can vary from using well established data such as known time and temperature combinations for reduction of pathogens (such as 70°C for 2 minutes or equivalent) through to challenge testing to determine how effective specific processes are.
- 2.1.2 There are three main options for FBOs serving beef burgers to the final consumer:
- 1) Thorough cooking of burgers in catering settings - section 3
 - 2) Removal of surface contamination (or reduction to an acceptable level) prior to mincing (e.g. “sear and shave”) – section 4
 - 3) Controls throughout the supply chain to reduce and/or minimise contamination followed by a validated cooking process – section 5
- 2.1.3 These three options will be explored in more detail in the following sections.

3. Thorough cooking

- 3.1 Thorough cooking to time and temperature combinations recommended by the ACMSF should be sufficient to reduce contamination by 6-log in a burger, which is accepted as a reduction to a safe level. Initial contamination is unlikely to be so high that it would not be removed by the level of reduction this cooking process achieves.
- 3.2 The time and temperature combinations could be achieved using a range of cooking techniques including conventional cooking procedures as well as more novel approaches such as sous vide. In all cases, the important factor is ensuring that the appropriate time and temperature combination is reached at the core of the burger.
- 3.3 Colour is not always a reliable indicator; burgers that remain pink but have been cooked to an equivalent time and temperature combination in Table 1 should be safe and FBOs must provide evidence that their process consistently achieves an appropriate time and temperature.

Table 1. Equivalent Heat Treatments⁹

<u>Temperature</u>	<u>Time</u>
60°C	45 minutes
65°C	10 minutes
70°C	2 minutes
75°C	30 seconds
80°C	6 seconds

- 3.4 Burgers that are cooked so that the centre of the burger reaches an equivalent time and temperature combination to those in Table 1 should be considered as thoroughly cooked, even if they appear less than well done.
- 3.5 Other time and temperature combinations can be used, but the FBO must be able to demonstrate that they have been validated as effective.
- 3.6 FSA advice for burgers made from meat other than beef remains that they should be thoroughly cooked all the way through, reaching a time and temperature combination at the centre of the burger equivalent to those in Table 1.

⁹Reference: ACMSF report on the safe cooking of burgers, June 2007
<http://www.food.gov.uk/sites/default/files/multimedia/pdfs/acmsfburgers0807.pdf>

Best Practice: FBOs using time and temperature combinations in cooking as a critical control should use a temperature probe when validating and verifying that the target temperature is achieved for the target amount of time in the centre of the burger. FBOs should see advice in the FSA guidance: E. coli O157 control of cross-contamination for appropriate controls to prevent cross contamination from equipment. A link to this guidance can be found in the “other Guidance” section of this document.

Control systems where burgers are less than thoroughly cooked

The following sections deal with scenarios where FBOs use an alternative approach, rather than the cooking of the final product as the critical control step. FBOs may use a reduced cooking time/temperature combination as part of a range of HACCP based controls aimed at reducing the risk for less than thoroughly cooked burgers to acceptable levels.

The range of HACCP based controls may vary from business to business and enforcement officers should assess the controls on a case-by-case basis and liaise with the primary authority for the business as appropriate.

4. Treatments in catering settings

Some FBOs in catering settings may choose to carry out processes which reduce or remove the contamination from the outside surface of whole cuts of meat before mincing and forming burger patties. Other FBOs may carry out processes that reduce the contamination in the burger patty to an acceptable level before then “finishing off” using traditional cooking methods for presentational reasons before serving the burgers. Therefore the searing (or other surface treatment) or other process (e.g. sous vide) and post process handling and preparation may be critical control points whereas the final cooking before service might not be.

4.1 Surface treatments - Sear and shave

- 4.1.1 One of the better-known approaches to this in a catering setting is a process known commonly as “sear and shave”, which is based on the same principle as cooking whole pieces of steak – searing the outside of the meat to kill bacteria. In this approach, the outside surface of a whole cut of meat is briefly heated to a high temperature (seared) to kill surface bacteria, while the deeper tissues remain raw. The seared surface can then be safely removed (shave) leaving the uncooked meat that can be used to produce lightly cooked/rare products safely.
- 4.1.2 The sear stage is needed to destroy contamination that might be present on the outer layer of meat. The seared outer layer of meat can then be removed safely and hygienically. Without the sear stage, if the top layer of raw meat is sliced or “shaved” off, there is potential to spread the contamination from the surface meat to the inner parts of the cut of meat. It is also important that FBOs do not pierce the surface of a cut of meat such as by using temperature probes or use utensils to tenderise the meat as this could cause contamination to be pushed into the cut of meat.
- 4.1.3 Where sear and shave is used, there are three key sets of processes, which the FBO will need to consider as part of their HACCP-based procedures to ensure

that the process is carried out safely. FBOs will need to demonstrate the following:

- i. The searing stage is effective in removing contamination – i.e. the combination of time and temperature applied to the surface of the meat is sufficient to reduce contamination from harmful bacteria by at least 6-log (see Table 1);
- ii. The slicing/shaving is carried out hygienically and safely to prevent any potential for re-contamination;
- iii. Handling of the meat following removal of the outer layer including; mincing; forming into patties; use of utensils during cooking etc., is done hygienically and safely to prevent any potential for re-contamination

4.1.4 It is possible that some businesses will use conventional cooking methods for the initial searing step. However, some may use other approaches such as steam, blanching in boiling water or others to achieve the same level of reduction prior to mincing. In all cases, FBOs must demonstrate that the procedures are validated as sufficient to achieve the desired and appropriate log reduction and that post process handling and storage is hygienic and appropriate. Information on approaches to validation can be found in **Annex A**.

4.1.5 LAs will need to be satisfied that the FBO provides evidence that their HACCP-based procedures for the three key steps are appropriate, that they are implemented effectively and consistently, and that they are compliant with other relevant legislation and general food law¹⁰. For FBOs with a primary authority partner, LAs are advised to liaise with the primary authority. Information provided by the primary authority about the business may be available on the Primary Authority Register.

4.2 Sear and Mince

4.2.1 It is also possible for FBOs 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 seared meat. As with “sear and shave” FBOs must ensure that the handling, preparation and storage of the meat after the searing process is safe and hygienic.

Note: For both sear and shave, and sear and mince, it is important to ensure effective controls are in place to prevent cross-contamination of the meat after searing, for example, separation of equipment and appropriate separation for storage of raw and

¹⁰ Regulation (EC) No 178/2002

ready to eat food. If surface treatment of meat for use in less than thoroughly cooked burgers is carried out to remove contamination prior to mincing, then it is important that FBOs ensure that controls are in place to prevent cross-contamination. For example, the meat must not then be handled, prepared and minced using equipment also used for raw meat that has not been treated to remove or reduce surface contamination of that meat. FBOs are advised to refer to the FSA guidance on preventing cross contamination including sections on complex equipment for more details (see “other guidance” section).

4.3 Other Controls

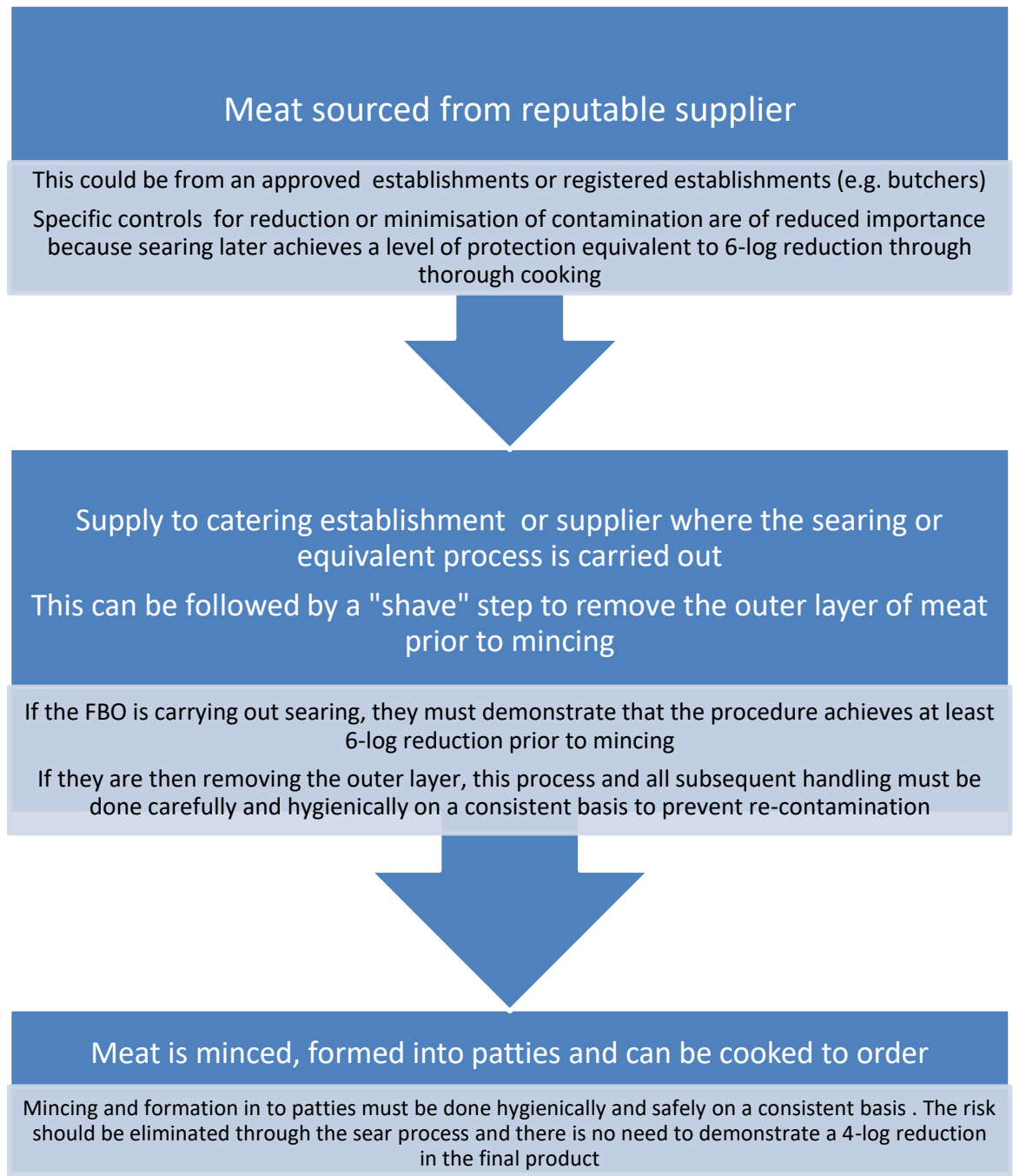
4.3.1 FBOs may also be able to put in place other controls to control the risk such as sous-vide cooking of burger patties/mince at catering settings, following which they can safely be cooked to preference. In these cases, the FBO must provide evidence to demonstrate that the process used is validated as sufficient to achieve the desired and appropriate log reduction, for example, the centre of the meat reaches a time and temperature combination equivalent to 70°C for 2 minutes (see table 1). Post process handling and storage must be hygienic and appropriate and where vacuum packing is used for sous vide cooking, FBOs are advised to refer to the FSA Guidance on vacuum packed foods:

<http://www.food.gov.uk/business-industry/manufacturers/shelf-life-storage/vacpac>

Note: In the scenarios in this Section, if the risk has already been reduced to an acceptable level¹¹, through either searing or use of other controls, the FBO does not necessarily need to demonstrate that the final cook achieves a 4-log reduction.

¹¹ 6-log reduction – see paragraph 3.1

Figure 1 – example of sear and shave at catering establishment:



Note: Although the risk has been significantly reduced, the FSA advises including advice to consumers at the point of ordering to highlight to consumers that although the burger is served pink, controls have been put in place to ensure this has been done safely. This is also important to reinforce the message to consumers of the risks associated with less than thoroughly cooking burgers in the home

5. Controls at suppliers and Risk and hazard management

5.1 Overview

- 5.1.1 The final series of controls described in this section relate to the control throughout the supply chain, followed by a less than thorough cook of the final product.
- 5.1.2 Restaurants and catering settings who intend to serve burgers less than thoroughly cooked, without first applying a searing process to the outside of the whole cut of meat which destroys contamination need to ensure that the meat used is as safe as possible. This means that the risk of harmful bacteria being present on the surface of the meat is as low as possible.
- 5.1.3 This requires the FBO serving burgers less than thoroughly cooked to ensure that controls are in place along the whole supply chain to minimise and/or reduce the risk of contamination at each step in the process prior to final cooking. Their suppliers must therefore specifically identify *Salmonella* and STEC, and any other relevant pathogens as particular hazards in their HACCP-based approach. There must be evidence that controls for these hazards have been identified and put in place by suppliers and that they monitor and verify that the controls are effective on an ongoing basis
- 5.1.4 FBOs wishing to serve less than thoroughly cooked burgers will need to demonstrate that they have discussed their requirements with suppliers to ensure that they are satisfied that the product specification and the procedures put in place are appropriate for minced beef that will not be thoroughly cooked. They may wish to develop a specification of the raw materials used to make the mince for burgers with their supplier. For example requiring that only cuts of meat least likely to be contaminated with pathogens of concern are used for the production of mince or burgers to be less than thoroughly cooked and that the meat is handled hygienically and appropriately throughout the supply chain.
- 5.1.5 They must also have documented and validated evidence of procedures that are capable of achieving at least a 4-log reduction, alongside the controls in the supply chain and advice to consumers at the point of ordering a burger.

Note: LAs are not expected to carry out validation on behalf of the FBO. The LA's role is to verify that the procedures in place are appropriate and that the validation of them by the FBO is sound. For FBOs with a primary authority partner, LAs are advised to liaise with the primary authority.

5.2 Controls at suppliers

- 5.2.1 FBOs serving less than thoroughly cooked burgers should ensure that their suppliers have procedures in place during slaughter, cutting, mincing and so on which are as hygienic as possible with the specific intention of preventing surface contamination with pathogens. Specific advice on best practice for reducing potential contamination for FBOs carrying out slaughter, cutting and manufacturing minced meat and burger patties is available in the Meat Industry Guide (MIG), and the FSA Clean Livestock Guide and other documents available on the FSA website:

www.food.gov.uk/business-industry/guidancenotes/meatregsguid/less-than-thoroughly-cooked-beef-burgers

The key aspects of these documents are highlighted in this section, but FBOs are advised to read the original documents for more detail.

- 5.2.2 FBOs serving less than thoroughly cooked burgers should ensure that meat used to produce the mince going into burgers comes from a slaughterhouse which effectively ensures that all cattle presented for slaughter are clean. Guidance on the relevance of implementing an adequate clean livestock policy and how this can be achieved for slaughterhouse operators is available at the following links:

Red Meat Safety & Clean Livestock:

www.food.gov.uk/sites/default/files/red-meat-safety-clean-livestock-policy.pdf

Clean Beef Cattle for Slaughter A Guide for Livestock Producers:

www.food.gov.uk/sites/default/files/clean-beef-cattle-for-slaughter-guide.pdf

- 5.2.3 Slaughterhouses, cutting establishments and processing (e.g. mincing) establishments should ensure that good practice for personal hygiene in the MIG (chapter 8) is in place as a minimum

https://www.food.gov.uk/sites/default/files/Chapter8-Personal_hygiene.pdf

- 5.2.4 Slaughterhouses should ensure best practice contained with the MIG for controls during the evisceration process (MIG Chapter 12, Section C 24 and C25) and skinning/hide removal (Chapter 12, Section A10-12) are in place:

https://www.food.gov.uk/sites/default/files/Chapter12-Dressing_of_carcases.pdf

- 5.2.5 Steam and vacuum can be used to remove minor visible contamination, dirt and hair from relatively smooth carcase surfaces provided that:

- This tool is only used to rectify **accidental** contamination of carcasses and not as a substitute for good hygiene or inadequate dressing practices, and
- The FBO maintains the responsibility for rectifying carcasses prior to post-mortem inspection (i.e. the FBO should either rectify contaminated carcasses while on the dressing line or divert them onto a rectification rail)

Results of microbiological tests on other species show that the use of steam vacuuming for removal of visible dung contamination, hair, etc. results in lower aerobe bacterial counts and lower numbers of positive *E. coli* tests than achieved by use of knife cutting. See Chapter 12 of the MIG:

https://www.food.gov.uk/sites/default/files/Chapter12-Dressing_of_carcases.pdf

5.2.6 Meat used for mincing should ideally be minced as soon as possible and within the required time specified in the hygiene regulations¹² and not stored or aged for any prolonged period. This is to minimise the potential for the growth of pathogens that might be present on the carcass. In the case of beef minced meat produced from chilled meat this is:

- i. within no more than six days of their slaughter or
- ii. within no more than 15 days from the date of slaughter of the animals in the case of boned, vacuum-packed beef and veal.

If FBOs intend to use meat which does not meet these requirements, other controls must be in place to ensure that the meat is safe. See following FSA guidance for further advice:

<https://www.food.gov.uk/sites/default/files/multimedia/pdfs/mincedmeatdays.pdf>

5.2.7 Where possible, mincing should be done using temperature control to keep the meat and resulting minced meat at as low a temperature as is practical. Although 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 additional safety control. This is because if the temperature rises, the bacteria

¹² Annex III Section V Chapter III 2 (b) (i) of Regulation (EC) No 853/2004

can grow and if it is present in higher numbers there is a greater likelihood of the bacteria surviving in the final product.

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

5.2.9 FBOs should ensure separation where appropriate to prevent cross-contamination, including separation of equipment used for more than one species (MIG Chapter 14 Section B6), or separation of equipment for use with both meat that has undergone treatment to reduce surface contamination and meat that has not. FBOs should also ensure that good practice on sterilisation of equipment and tools is followed (MIG Chapter 14 Section B7 & 8):

<https://www.food.gov.uk/sites/default/files/chapter14.pdf>

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

5.2.11 The FSA has produced a model basis for a HACCP-plan for cutting and mincing which can be found here:

www.food.gov.uk/business-industry/meat/haccpmeatplants#toc-5

Additional controls

5.2.12 Suppliers of whole cuts of beef, minced beef meat or burger patties may wish to use procedures or apply treatments to the surface of the meat that reduce levels of contamination prior to supplying it to catering establishments. This could involve the searing type approach described above (Section 4), or treatments such as lactic acid. Any surface treatments carried out in approved establishments must be ones that are allowed under the Hygiene Regulations¹³ such as use of lactic acid on carcasses, sides or quarters at slaughterhouses. In this case FBOs need to follow the requirements in the relevant legislation¹⁴. At present, lactic acid and potable water are the only substances that can be used to reduce the contamination on the surface of meat in approved establishments such as slaughterhouses.

5.2.13 The European Food Safety Authority Scientific Opinion on the use of lactic acid on beef carcasses found that this is a safe and effective means of reducing

¹³ Including Regulation (EC) No 853/2004

¹⁴ Commission Regulation (EU) No 101/2013 Of 4 February 2013 concerning the use of lactic acid to reduce microbiological surface contamination on bovine carcasses
<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0101&qid=1437650483287&from=EN>

contamination with bacteria on the surface of meat. Please refer to the Regulation in the link below for details of conditions of use of lactic acid

5.2.14 HACCP-based procedures following the use of lactic acid to reduce surface contamination must be appropriate to prevent re-contamination following treatment, for example hygienic handling, dedicated mincing equipment and so on.

Advice on treatments is also contained in the MIG Chapter 12 Section A15:

https://www.food.gov.uk/sites/default/files/Chapter12-Dressing_of_carcases.pdf

5.2.15 The FBO at supplier level carrying out any processes such as these must demonstrate how they are put in place effectively and safely and the CA officer for the FBO in question should verify that the HACCP-based procedures are appropriate. As some suppliers may be FSA approved establishments, the CA for supplying establishments will be the FSA in some circumstances

5.2.16 FBOs at the supplier level may also be able to put in place other procedures to control the risk such as sous-vide cooking of burger patties/ mince, High Pressure Processing (HPP) and so on, prior to supply to catering settings following which they can safely be cooked to order.

5.2.17 In these cases, the FBOs serving burgers less than thoroughly cooked must provide evidence to demonstrate that the process used is validated as sufficient to achieve the desired and appropriate log reduction of the hazards identified. They may therefore need to obtain this evidence from their suppliers to include as part of their documentation of the controls through the supply chain. They will also need to ensure and that post process handling and storage is hygienic and appropriate and that they prevent cross-contamination of processed patties, for example from raw meat.

5.2.18 suppliers considering the use of processes to reduce surface contamination may wish to consider the FSA's commissioned study on consumers' attitudes towards raw meat decontamination treatments:

<http://www.food.gov.uk/science/research/foodborneillness/b14programme/b14projlist/fs241052>

Best Practice: where FBOs serving burgers which are less than thoroughly cooked and are using source control and pathway management, best practice includes ensuring that suppliers have in place procedures which can **remove** or **reduce** the contamination on the surface of meat, prior to mincing, not just minimising potential for contamination to occur.

This could include treatments such as lactic acid treatment in approved slaughterhouses, use of steam to the outside surface of meat and so on

5.3 Verification of HACCP- based procedures at suppliers

Sampling and testing regimes should be established alongside HACCP-based procedures to validate and verify controls, with specific corrective action that FBOs will take in the event of unsatisfactory sampling results, such as presence of pathogens. Although sampling is not a guarantee of the safety of a product, it is an important means of verifying that HACCP is effective. Sampling plans should take into account the requirements in microbiological criteria regulations alongside other sampling relevant to other hazards identified as part of the FBO's specific HACCP-based approach, for example STEC.

5.3.1 Microbiological Criteria sampling

FBOs supplying mince to be used in burgers or meat preparations that will be less than thoroughly cooked should carry out verification sampling in accordance with microbiological criteria for mince to be consumed raw. Meat preparations include minced meat with seasoning or additives added formed into burger patties.

5.3.2 The Microbiological Criteria Regulation contains two food safety criteria for minced meat which are relevant for minced beef meat¹⁵:

Food Category	Micro-organisms/their toxins, metabolites	Sampling plan		Limit	Analytical reference method	Stage where the criterion applies
1.4 Minced meat and meat preparations intended to be eaten raw	<i>Salmonella</i>	5	0	Absence in 25g	EN/ISO 6579	Products placed on the market during their shelf-life
1.6 Minced meat and meat preparations made from other species than poultry intended to be eaten cooked	<i>Salmonella</i>	5	0	Absence in 10g	EN/ISO 6579	Products placed on the market during their shelf-life

5.3.3 Burgers that are not thoroughly cooked will contain some meat that is not cooked all the way through. The FSA therefore considers that the more

¹⁵ There is an additional criterion for minced poultry meat which is not in the scope of this advice on burgers

stringent of the two criteria (absence in 25g, for minced meat or meat preparations intended to be eaten raw) should be applied when FBOs are carrying out sampling to verify that their HACCP-based approach to producing mince is effective in compliance with the Microbiological Criteria Regulation¹⁶. The FBO serving burgers should be able to demonstrate to their LA that the establishment producing and supplying the minced meat has carried out sampling in accordance with this criterion that at and that the results are compliant¹⁷. **Note:** the derogation from sampling provided for approved establishments that produce less than 2 tonnes per week of combined minced meat and meat preparations not to carry out this testing does not apply when these are intended for food to be eaten less than thoroughly cooked.

5.3.4 The requirement for verification sampling applies to any FBOs manufacturing/producing and supplying minced meat or meat preparations to the restaurant/caterer where it will be used to make burgers that are less than thoroughly cooked.

5.3.5 Restaurants and caterers may also choose to carry out additional sampling of incoming raw mince or meat preparations, in which case the criterion for absence of Salmonella in 25g should also apply at that stage as the criterion applies to products placed on the market during their shelf life. Sampling plans should be appropriate to the nature and size of the business, provided that the safety of the food is not compromised.

5.3.2 Additional sampling

Given that suppliers' HACCP-based food safety management systems should include controls for other hazards, including STEC, FBOs should also consider additional verification sampling alongside the criteria in Regulation EC (No) 2073/2005 and identify procedures for the appropriate corrective action in the case of unsatisfactory results.

5.3.3 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 which will be less than thoroughly cooked.

5.3.4 Where appropriate, the FBO should be able to demonstrate how meat for consumption in less than thoroughly cooked burgers is kept separate from meat

¹⁶ The Regulation also contains process hygiene criteria for generic (not pathogenic) *E. coli* which FBOs must comply with

¹⁷ Absence of Salmonella in a 25g sample. If Salmonella is detected, the product is non-compliant with that criterion

for other uses such as meat only suitable for consumption following through cooking.

5.4 Risk and hazard management – controls at catering establishment

- 5.4.1 Catering establishments and restaurants should have included details of the controls described in sections 5.2 and 5.3 as pre-requisites as part of their overall control programme for incoming raw ingredients. Their own HACCP-based food safety management system must then demonstrate how the risk is reduced to an acceptable level before service to the final consumer.
- 5.4.2 FBOs should ensure that there is strict temperature control for the meat, minced meat or patties they are supplied with in order to limit any potential for growth of harmful bacteria. If they are receiving patties which have been processed by suppliers to reduce the contamination, FBOs need to ensure careful and hygienic handling, preparation and storage of the meat to prevent re-contamination, for example from raw meat or equipment that has come into contact with raw meat.
- 5.4.3 In this scenario, cooking is likely to be a critical control point and FBOs have a responsibility to ensure that the systems they have in place are validated and appropriate in accordance with requirements in the Hygiene Regulations¹⁸.
- 5.4.4 FBOs in catering settings may use conventional cooking approaches but may also develop new and/or innovative approaches to reducing the risk to an acceptable level including procedures to reduce contamination from the surface of whole cuts of meat. These might be physical (e.g. steam, boiling water, etc.) or chemical treatments (e.g. organic acids). The FBO must be able to demonstrate that the procedures they use are safe and in the case of chemical treatments such as organic acids, that they comply with other relevant legislation including the general food law and additives legislation¹⁹.
- 5.4.5 The validation and verification of the effectiveness of controls should include robust evidence that the cooking procedure, or combination of cooking and other procedures in the catering setting used by the FBO is sufficient to achieve at least a 4-log reduction in pathogens in the burger. Validation could include use of

¹⁸ Article 5 of Regulation (EC) 852/2004

¹⁹ Regulation (EC) No 1333/2008
<http://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:354:0016:0033:EN:PDF>

scientific data, modelling and possibly challenge testing. Further advice on the process of validation and LAs' role can be found in **Annex A**

Note: the FBO must be able to demonstrate that their procedures are effective in reducing the risk to an acceptable level prior to commencing serving burgers less than thoroughly cooked. As explained in paragraph 1.6.5, FBOs must also notify the LA before they begin serving burgers in this way.

5.5 Verification at catering settings

- 5.5.1 FBOs must ensure that they have a process for monitoring to ensure that processes are being implemented effectively, in line with requirements to monitor HACCP-based systems in food hygiene legislation²⁰. This might include a sampling plan, but should also include other ways of monitoring that controls are implemented effectively, such as temperature probing the centre of burgers to ensure that they reach the required temperature for the right amount of time.
- 5.5.2 Where sampling is used, FBOs will have to design a sampling plan based on the nature and size of the business and taking into account the controls in place. Whilst recognising the limitations of sampling and that it is not a guarantee of the safety of a product, this can form part of an overall set of procedures to monitor the effectiveness of the controls throughout the supply chain, including at the catering establishment. LAs should be satisfied that where sampling plans are used, these are appropriate

5.6 Consumer protection - Consumer advisory statements

- 5.6.1 Although there is no specific requirement for labelling of less than thoroughly cooked burgers in legislation, Article 14 of Regulation 178/2002 includes that when considering whether food is unsafe (or safe) regard shall be had to information provided to consumers, and in particular to those consumers in vulnerable groups:

“3. In determining whether any food is unsafe, regard shall be had:

...(b) to the information provided to the consumer, including information on the label, or other information generally available to the consumer concerning

²⁰ Article 5 of Regulation (EC) No 852/2004

the avoidance of specific adverse health effects from a particular food or category of foods

And:

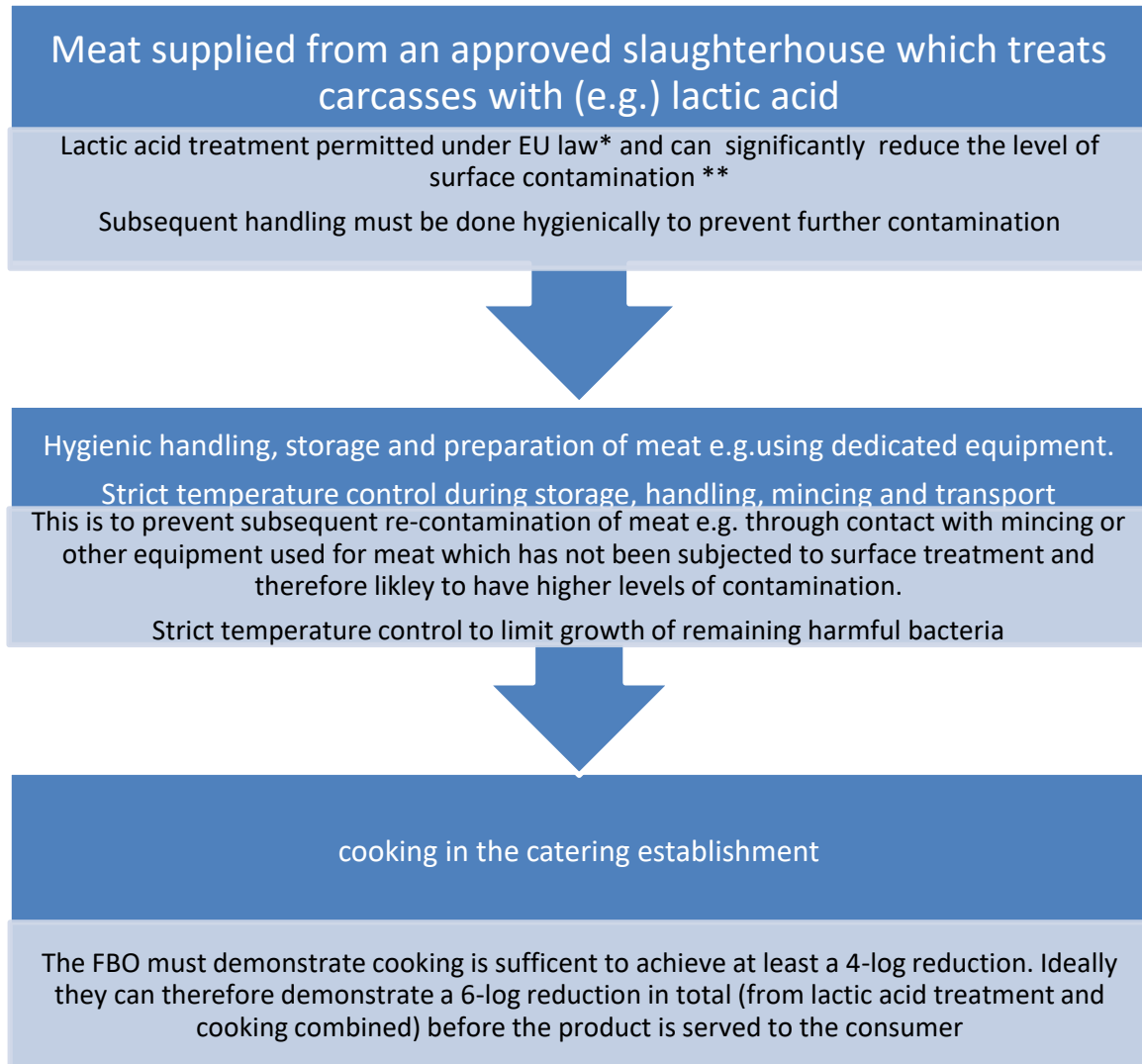
4. In determining whether any food is injurious to health, regard shall be had:

*(c) to the particular **health sensitivities of a specific category of consumers** where the food is intended for that category of consumers”*

- 5.6.2 Where there is a food or group of foods that carries at a level of risk that is deemed as elevated but still within acceptable levels of risk, but that risk is not communicated to consumers to allow them to consider that before they order/eat it, this could be considered as not fully compliant with general food law.

More detail on consumer advisory statements can be found in **Annex B**

Figure 2. Surface treatments carried out at suppliers



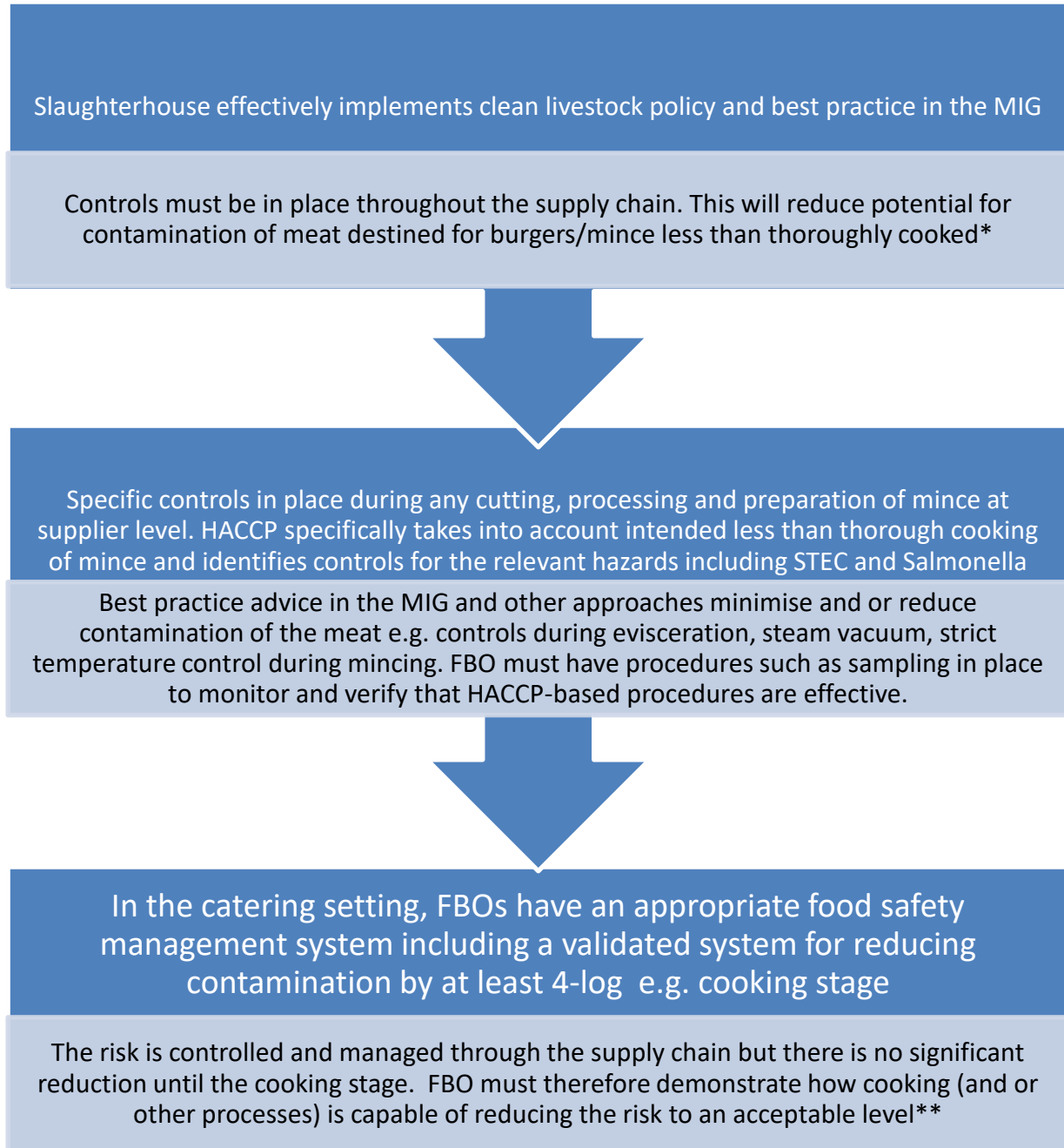
*Commission Regulation (EU) No 101/2013 ²¹

**This is based on data presented to and assessed by the European Food Safety Authority (EFSA²²). Because of the variability between various scientific studies, it is recommended that food business operators validate the antimicrobial efficacy under their specific processing conditions. It is also recommended that FBOs consider how the lactic acid is applied

²¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0101&qid=1447769174065&from=EN>

²² <http://www.efsa.europa.eu/en/efsajournal/pub/2317>

Figure 3. Controls at suppliers and Risk and hazard management



*The FBO serving burgers must ensure that appropriate controls through supply chain are in place at their suppliers and provide evidence to demonstrate this.

**Information must be available to consumers at the point of ordering a burger. This is to reflect that although the risk is controlled through the supply chain and significantly reduced, there is a greater chance that a less than thoroughly cooked burger will contain harmful bacteria than a thoroughly cooked one.

6. Other guidance and considerations

6.1 The Meat Industry Guide (MIG) contains advice for best practice during production of meat, minced meat and meat preparations.

<https://www.food.gov.uk/business-industry/meat/guidehygienemeat>

6.2 The FSA has produced a model basis for a HACCP-plan for cutting and mincing which can be found here:

www.food.gov.uk/business-industry/meat/haccpmeatplants#toc-5

6.3 The advice in this document on control systems supersedes the ENF advisory letters²³ but it is not intended as a replacement for other existing FSA guidance on separate or related subjects (e.g. FSA guidance on preventing cross contamination). LAs and FBOs should use this advice alongside other formal guidance from the FSA to help and support with compliance with food law and food hygiene requirements. It remains important in catering and retail settings serving burgers less than thoroughly cooked that the raw meat is not a source of cross-contamination to ready to eat foods. FBOs and LAs should make use of all relevant advice and guidance.

Additional information to enforcement officers on this subject is available here:

www.food.gov.uk/enforcement/enforcework/food-law/guidance-enforcement

A link to the FSA guidance: *E. coli* O157 control of cross-contamination:

<https://www.food.gov.uk/business-industry/guidancenotes/hygguid/ecoliguide>

6.4 Primary Authority Advice may have been issued to a business by its primary authority partner. An Inspection Plan may be in place in relation to the business' food safety activities. Additional information from the primary authority may be available to enforcing authorities on the Primary Authority Register. All of which may be helpful to a LA (enforcing authority) when regulating a business within primary authority. Enforcing authorities must also be aware of the obligations placed upon them by the scheme. For more details see:

<https://primaryauthorityregister.info/par/index.php/home>

²³ Letters sent in England: <http://www.food.gov.uk/sites/default/files/ENF-E-15-004.pdf>
<http://www.food.gov.uk/sites/default/files/ENF-E-15-024.pdf>
<http://www.food.gov.uk/sites/default/files/enf-e-15-033.pdf>

Separate letters sent in Wales and Northern Ireland can be found here:
<http://www.food.gov.uk/enforcement/codes-of-practice/centralref>

6.5 If FBOs are using sous-vide techniques which involve vacuum packing, the FSA advises consulting the vacuum packing guidance:

<http://www.food.gov.uk/business-industry/manufacturers/shelf-life-storage/vacpac>

6.6 Where caterers use a more general HACCP-based approach to other procedures in place in their catering establishment, for example advice on cleaning and so on in SFBB, and also wish to serve burgers less than thoroughly cooked, they must put in place additional supporting documentation specifically regarding the HACCP-based approach to the safe production of burgers. Advice in materials such as SFBB and the Safe Catering pack is based on reducing the risk through thorough cooking so where other approaches are used, the FBO must be able to demonstrate how they control the hazard and reduce the risk to an acceptable level.

Links are below.

SFBB:

<http://www.food.gov.uk/business-industry/sfbb>

Safe Catering guide:

<http://www.food.gov.uk/northern-ireland/news-updates/news/2015/5595/safe-catering-issue5>

MyHACCP:

<https://myhaccp.food.gov.uk/>

6.7 Advice to LAs on enforcement and Food Hygiene Ratings Scheme in relation to FBOs serving burgers can be found here:

www.food.gov.uk/enforcement/enforcework/food-law/guidance-enforcement

7. Contacts

7.1 For enquiries from **Local Authorities** please contact the following:

England: LAHygieneEnquiries@foodstandards.gsi.gov.uk

Wales: lasupportwales@foodstandards.gsi.gov.uk

Northern Ireland: executive.support@foodstandards.gsi.gov.uk

7.2 FBOs are advised to discuss any queries with their primary authority partner if applicable or with their LA in the first instance.

Annex A: principles to consider as part of a validation process

1. Codex Alimentarius²⁴ draft guidelines on the validation of food safety control systems²⁵ outline three pre-validation activities that underpin the process of validation of food safety management systems. These are related to the FBO's responsibility to have systems based on HACCP principles:
 - i. Identification of the relevant hazards for the food/process
 - ii. Identification of the food safety outcome required
 - iii. Identification of the procedures to be in place to achieve the outcome required, that need to be validated

2. An example of this, based on the controls at suppliers, risk and hazard management at the catering setting might be:
 - i. Identification of STEC and Salmonella as major pathogens of concern*
 - ii. Reduction of these pathogens to an acceptable level in the burger before it is served*
 - iii. Cooking to a minimum time and temperature combination which consistently achieves a 4 log reduction*

3. When considering the importance of validation of procedures the Codex guidance also advises taking into account the severity of the hazard concerned:
 - *Adverse health effect: The higher the potential for an adverse health effect from a hazard, the more attention should be paid to assuring that the set of control measures selected is effective. Consideration should be given to the size of the population and the age/sex of groups most at risk.*

4. A process of validation by the FBO should be carried out to ensure that the proposed control systems and procedures are effective in terms of controlling the hazards identified as part of the three pre-validation steps above. The validation process by the FBO can include the following, singly or in combination:

²⁴ The Codex Alimentarius or "Food Code" was established by FAO and the World Health Organization in 1963 to develop harmonised international food standards, which protect consumer health and promote fair practices in food trade

²⁵ <http://www.codexalimentarius.org/codex-home/en/>

I. Reference to available existing scientific and/or technical information and literature.

This may relate specifically to the process in question or a range of information can be used as the basis for assessing the suitability of controls proposed. For example, where time/temperature combinations are well known, this may be used as the basis for the validation of a similar approach. Examples of this are the time and temperature combinations contained in the ACMSF report on the safe cooking of burgers and included in Table 1.

This could also take the form of data from industry such as previous validation studies. Where previous data is used, it is important to ensure that the product and process in question are consistent with the parameters previously tested or assessed. In the example of burgers, this might include things such as ingredients (type of meat), size of patty, temperature.

II. Scientifically valid experimental data, specific to an FBO's controls

FBOs may wish to carry out their own set of experimental procedures, or commission an expert to do so on their behalf, to assess their specific set of controls in its ability to meet the desired outcome described in their pre-validation steps. In the case of burgers which are less than thoroughly cooked, this might include some form of microbiological challenge testing which assesses the reduction of known levels of hazard (pathogens) in the product when subjected to the proposed controls; for example the cooking step. The FSA position is that where other controls are not in place to remove the risk (e.g. sear and shave), FBOs should be achieving at least a 4-log reduction in the final product, alongside other controls to reduce or minimise contamination along the supply chain. This should be accompanied by messages to consumers on the elevated level of risk.

LAs have a responsibility to verify that the controls in place are appropriate and therefore whether evidence to support validation of processes is robust enough. FBOs are advised to discuss any approaches to gathering experimental data with their expert to ensure that they generate a sufficient amount of data on which to base the cooking time and temperature. Experiments should be designed bearing in mind the potential variability in reductions of pathogens that might be observed during experiments due the inexact nature of cooking techniques and their impact on pathogens at lower time and temperature combinations. The focus of challenge testing should be on establishing what time and temperature combination at the centre of a given burger can reliably achieve a desired log reduction; with 4-log reduction the minimum where FBOs are relying on controls to reduce contamination throughout the supply chain followed by a less than through final cook. LAs will need to be provided with a sufficient

level of data and evidence that the specific time temperature combinations proposed can consistently achieve the desired log reduction.

Given that this can be a costly and time-consuming process; where there are common approaches used by more than one part of the industry there may be scope to consider a collaborative approach. This can only be relied upon where the key characteristics of a product and processes used are consistent e.g. size, thickness, ingredients and so on of a burger patties.

III. Predictive/Mathematical modelling

Modelling can be used to assess the effect of a set of known parameters on food in place of obtaining new experimental data. It is possible that the effect of a given cooking process on the level of pathogens can be modelled to see how effective a cook step might be. This will be dependent on the model having sufficient data on which to predict the effects of different treatments and a reliable indication of both the intrinsic factors of the food (e.g. size, ingredients etc.) as well external factors, including the likely level of initial contamination. The latter might need to be assessed through data such as historical monitoring data or survey data.

As above, the FSA position is that FBOs should be achieving at least 4-log reductions in the final product, alongside the other controls in place and consumer messaging.

IV. Historical data

This might include building up an understanding of the levels and prevalence of indicator organisms and pathogens in the ingredients and the final product over time. Although sampling is not in any way a guarantee of the safety of a product, particularly in relation to hazards such as *E. coli* O157 and other STEC, which do not typically occur frequently and can have a low infective dose, sampling results obtained over a period of time can be used to give greater assurance that the process is under control through HACCP-based systems.

Where the systems are appropriately validated and the LA is satisfied with the approach taken, but the FBO is not achieving the equivalent of a 6-log reduction, LAs should be satisfied that there is evidence that the FBO can achieve the equivalent of at least a 4-log reduction in the product and this should be accompanied by messages to consumers. The FBO must also continue to monitor and verify that procedures are effective on an ongoing basis as part of their HACCP-based food safety procedures.

Annex B: Consumer messages at the point of ordering

1. Messages used should be clear, meaningful and easily understandable for consumers. Consumer messages are not a substitute for other controls, and the FBO must still be able to demonstrate to the satisfaction of the LA that their HACCP-based procedures are appropriate.
2. The FSA has conducted additional consumer focused research on the effectiveness of consumer advisory messages at the point of ordering which was published in July 2016. The findings of the research have been taken into consideration along with comments from local authority and industry stakeholders to develop revised wording for consumer messages. The FSA now proposes using the following wording that can be adapted as appropriate:

“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.”

3. FBOs who serve burgers less than thoroughly cooked but have procedures in place which are equivalent to ACMSF advised 6-log reductions (e.g. sear and shave) or which are cooked to an equivalent level but have the appearance of being less than thoroughly cooked (e.g. sous vide or other lower temperature longer time cooking) may wish to consider including a message to consumers to reassure them that the controls in place have addressed the risk.
4. Such a message would not need to be the same as the message that FSA proposes where there is not a 6-log reduction and may explain and reassure consumers that the controls in place have addressed the risk.

Glossary

Catering settings - for the purposes of this document, catering settings refer to any establishment directly preparing, cooking and supplying food to the final consumer such as restaurants, burger outlets and pubs.

Competent Authority (CA) - the central authority of a Member State competent to ensure compliance with the requirements of the Hygiene Regulations (in this case FSA) or any other authority to which that central authority has delegated that competence (LAs)

Log reduction – short for logarithmic reduction, means a ten-fold reduction e.g. in number of bacteria in this case. 1 log reduction = 90% reduction; 4 log reduction = 99.99% reduction 6 log reduction = 99.9999% reduction

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

STEC - Shiga toxin producing *Escherichia coli* (*E. coli*)

Validation - Obtaining evidence that a control measure or combination of control measures, if properly implemented, is capable of controlling the hazard to a specified outcome

Verification - checking, by examination and the consideration of objective evidence, whether specified requirements have been fulfilled.