
AN UPDATE ON BURGERS SERVED LESS THAN THOROUGHLY COOKED IN FOOD SERVICE OUTLETS

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1 SUMMARY

- 1.1 This paper provides an update on all aspects of the work completed and underway to implement the position adopted by the Board in September 2015 that the service of burgers that are not thoroughly cooked is unacceptable unless a range of controls is in place.
- 1.2 Expectations of businesses preparing and serving less than thoroughly cooked burgers are now clear. It is also clear when enforcement action should be taken where FBOs are not compliant.
- 1.3 The Board is asked to:
 - **confirm** that it is satisfied with the progress that has been made on identifying and implementing controls throughout the supply chain, and the planned future steps set out in this paper, for mitigating the risk of eating burgers served less than thoroughly cooked in food service outlets. In particular:
 - advice to FBOs and LAs:
 - publication by the FSA of extensive advice on suitable controls that may be included in HACCP-based food safety management systems for FBOs throughout the supply chain, from slaughter of animals through to the preparation and sale of burgers in catering settings;
 - development of advice in conjunction with the ACMSF on time and temperature combinations capable of achieving a 4-log reduction to help LAs and FBOs apply these consistently, unless they choose to use bespoke validation of their own processes;
 - launch of a public consultation on the proposal that approved establishments should have an approval which more specifically reflects the nature of their activities;
 - improved understanding of the combined impact of interventions through the food supply chain, based on advice from ACMSF;
 - more consistent consumer messaging at point of ordering:

- completion of FSA funded consumer research on the effectiveness of messages at the point of ordering and ongoing work with the industry and LAs to develop a model wording for on-menu messages;
- communicating risks to consumers:
 - establishing a baseline for consumer awareness of the FSA messages on risk about burgers and the difference between cooking at home and eating out, which will be used to track changes in awareness;
 - development of a consumer engagement plan to ensure that consumers are aware of the advice on thorough cooking in the home and the reasons for the difference in the advice when eating in catering settings.
- **identify** any additional steps, measures or evidence that would enhance the FSA's ability to manage the risk to consumers; and
- **consider** and **agree** the suggestion from the food service sector that where food service establishments can demonstrate that, regardless of "source controls" in place, they have controls in place within the food service premises for the preparation of burgers that deliver the same level of protection as thorough cooking (6-log reduction), they should not need to have the same consumer messaging in place as those serving less than thoroughly cooked burgers that rely on "source controls" to meet the position adopted by the FSA Board.

2 INTRODUCTION

2.1 The FSA Board first considered the acceptability of burgers served less than thoroughly cooked in catering settings at their meeting on 28 January 2015. This was against a background of a lack of clarity on proportionate enforcement relating to such processes. The position at that time was untenable, and did not in practice lead to effective consumer protection. The FSA Board were clear they remained strongly of the view that consumers should avoid eating undercooked burgers, but in the interests of providing clarity agreed to advise local authorities to focus their enforcement on businesses which lacked either or both of:

- a robust, tested HACCP-based approach which demonstrated a 4-log reduction in bacterial load; and
- consumer advice to draw attention to the risk of eating rare burgers, particularly for vulnerable groups of consumers.

2.2 At their meeting on 9 September 2015 the Board reviewed its interim position and adopted the position that the service of burgers that are not thoroughly cooked is **unacceptable** unless:

- a validated and verified food safety management plan is applied by the food business operator that combines:

- source control through the sourcing of meat only from establishments approved under EU legislation for the supply of minced meat intended to be eaten raw or lightly cooked and whose sampling is carried out in accordance with microbiological criteria for mince to be consumed raw; and
- specific identification of Salmonella and STEC¹, among other pathogens, as particular hazards within food safety management plans, with evidence that controls for these organisms have been validated and their effective application is verified. Sampling and testing regimes should be established within those plans to validate and verify controls, with specific corrective action in the event of adverse results; and
- pathway management, in which any prior treatment in the catering establishment (such as steam treatment or searing), together with cooking lead to a combined reduction of at least 4-log in the load of microbiological flora (demonstrated by challenge testing or alternative validation); and
- businesses pre-notify their LA of their intention to serve burgers in this way
- “receptor protection” through the adoption of an appropriate consumer advisory statement at the point of ordering food – with FSA taking a lead on ensuring statements are consistent e.g. on menus, and the practice that children are only served burgers that are well-done

2.3 The Board also agreed that, in parallel to implementation of the above, the executive should:

- Provide them with assurances that the controls put in place and maintained by suppliers of minced meat intended for consumption raw or lightly cooked are effective in reducing pathogen prevalence and/or load in minced meat. Explore how the use of a combination of these controls, when combined with others through the supply chain, lead to a level of risk reduction that is equivalent to thorough cooking of burgers made from standard mince;
- Secure advice from the Chief Scientific Adviser and, as necessary, the Advisory Committee on Microbiological Safety of Food on impactful interventions that may be used in either source control or pathway management; and
- Identify measures we would use to track the impacts of the application of these new controls (for example, lab-confirmed human STEC cases) and the levels of each of these measures that would trigger referral of the issue back to the Board.

2.4 The actions undertaken to address these Board decisions and their status is summarised in the table below.

¹ Shiga-toxin producing E. coli

Summary of actions taken to address Board decisions

Date of decision	Action sought	Action undertaken	Date completed
Jan 2015	FSA to update Local Authorities on its position and provide advice on enforcement	Provisional advice sent to LAs published (extended and revised in August and November 2015)	March 2015 ²
		Following consultation, consolidated advice published for FBOs and LAs including controls through supply chain, verification and an approach to enforcement; FSA wrote to LAs and interested parties to raise awareness of the advice	May 2016 ³
	FSA to commission further modelling to assess public health risk	Further research commissioned and completed	July 2015; reported to the Board September 2015
	Ensure that consumers are aware of the advice on thorough cooking at home	FSA web-story to remind consumers about the safe cooking of burgers published	March 2015 ⁴
Sept 2015	Reassurance that FBOs notify the LA prior to engaging in the production and service of less than thoroughly cooked burgers	Requirement for notification published on FSA website	September 2015 ⁵
		Further advice, including the legal basis for FBOs being required to notify the LA, sent to LAs and published on the FSA website	November 2015 ⁶

² <http://www.food.gov.uk/sites/default/files/ENF-E-15-004.pdf>

³ <http://www.food.gov.uk/business-industry/guidancenotes/meatregsguid/less-than-thoroughly-cooked-beef-burgers>

⁴ <http://www.food.gov.uk/news-updates/news/2015/13707/fsa-reminds-consumers-about-safe-preparation-of-burgers-at-home>

⁵ <https://www.food.gov.uk/news-updates/news/2015/14419/fsa-board-decision-on-rare-burgers>

⁶ <http://www.food.gov.uk/sites/default/files/enf-e-15-033.pdf>

Date of decision	Action sought	Action undertaken	Date completed
Sept 2015 (continued)	FSA to take a lead in ensuring that messages are in place and are consistent	Additional consumer research commissioned and completed	May 2016
		Workshop with stakeholders to develop the basis for a consistent message	July 2016
		Update advice published 6 May 2016 to include updated FSA advice on consumer messages	By September 2016
	FSA to implement a communications plan	Research completed on consumer awareness, risk perceptions and acceptability.	August 2015 ⁷
		Research completed into consumer awareness of FSA advice on consumption in the home to establish a baseline for future message tracking	April 2016
		Second phase of consumer research completed on the effective elements of messages at point of sale	May 2016
		Communications plan agreed and a consumer marketing campaign due to commence	Campaign from August 2016
	Ensure that meat should only be sourced from establishments approved to supply meat intended to be eaten less than thoroughly and their controls and verification measures are effective	Advice on controls and verification measures through the supply chain provided and published on the FSA website	August 2015 ⁸ and consolidated May 2016
		FSA policy on requiring specific approval reviewed	May 2016
		Consultation on the impact of requiring specific approval with the meat industry commenced June 2016	Consultation closes Sept 2016

⁷ <http://www.food.gov.uk/sites/default/files/fsa-risk-rare-burgers.pdf>

⁸ <http://www.food.gov.uk/sites/default/files/ENF-E-15-024.pdf>

Date of decision	Action sought	Action undertaken	Date completed
Sept 2015 (continued)	FSA undertakes work on modelling the effectiveness of potential impactful interventions through supply chain that may be used in either source control or pathway management. To draw on expert advice from the ACMSF and explore how the use of a combination of these controls, when combined with others through the supply chain, lead to a level of risk reduction that is equivalent to thorough cooking of burgers made from standard mince	Review evidence and prioritise appropriate interventions to be modelled, using expertise from ACMSF and complete modelling	May 2016 and presented to ACMSF June 2016
		Further primary research into other promising interventions where data are lacking	To be scoped, following June 2016 ACMSF meeting
	Identify measures we would use to track the impacts of the application of these new controls and the levels of each of these measures that would trigger referral of the issue back to the Board	Outbreak data monitored to identify where there might be an association with consumption of burgers	May 2016
		PHE to develop an exposure-exceedance system using standard consumption data and enhanced surveillance for STEC	Underway, to be finalised by September 2016

- 2.5 Since the first Board discussion in January 2015, the FSA has also ensured that support has been provided to FBOs and LAs with interpretation and implementation of the FSA advice and on specific issues as they have arisen. There is now comprehensive advice in place for FBOs on the range of controls that can be applied to maintain risks at a level that is not unacceptable, and for LAs on taking appropriate enforcement action where these controls are absent or not implemented effectively. The advice will be updated as further work is completed, for example on consumer research on risk messaging and scientific research in collaboration with ACMSF on time and temperature modelling for 4-log reductions.

3 STRATEGIC AIMS

- 3.1 The paper in September 2015 on burgers set out the strategic issues for consideration of what we called “risky” foods:
- the focus of our strategy to 2020 on delivering against a broad range of consumer interests in relation to food including the ability to make informed choices, i.e. “food is safe and what it says it is, and we have access to an affordable, healthy diet, and can make informed choices about what we eat, now and in the future”;
 - the right of consumers “to be protected from unacceptable risk”;
 - the need for public risks to be not only assessed, but also managed, communicated and governed; and
 - the statutory duty on the FSA to consider costs and benefits, as well as risks, when deciding whether and how to act.

4 UPDATE AND DISCUSSION

“Source Control” - controls in the supply chain

- 4.1 The Board agreed that where catering settings intend to serve less than thoroughly cooked burgers, they must source the meat from establishments which have the appropriate controls in place and which ensure that verification of those controls takes into account the microbiological criteria in EU legislation for meat that will not be cooked.
- 4.2 The consolidated advice published on 6 May 2016 includes advice and resources for businesses supplying meat used for burgers in catering settings selling burgers that will not be thoroughly cooked. This includes model HACCP documentation and updates to the meat industry guide (MIG), designed to help suppliers to develop appropriate HACCP-based procedures when producing minced meat and meat preparations that are intended for less than thorough cooking. We have written to all LAs in England, Wales and Northern Ireland and to approved minced meat and meat preparations establishments to ensure that they are aware of this advice. We have updated the Manual for Official Controls used by FSA staff when carrying out official controls in food establishments under FSA jurisdiction to include detailed information on controls and verification sampling in establishments involved in the supply chain for these catering settings.

- 4.3 The competent authority (CA, which will be the FSA or LA depending on the type of establishment) will assess the HACCP-based procedures and associated means of verification to ensure that they are implemented effectively in establishments in the supply chain, using the advice published on 6 May 2016 and the updated Manual for Official Controls. Where the FBO is unable to demonstrate to the CA that these controls are in place and implemented effectively, enforcement action will be taken. We will seek structured feedback on enforcement action taken in relation to HACCP-based procedures in these premises and include in future reports to the Business Committee.
- 4.4 In summary, the approach we have taken to date provides information and advice to establishments supplying minced meat intended to be eaten raw or lightly cooked on the implementation of HACCP based procedures, and assurance through CA verification of those controls.
- 4.5 The Board decision in September 2015 foresaw that meat for this purpose should only be sourced from establishments approved under EU legislation for the supply of minced meat intended to be eaten raw or lightly cooked. We are therefore consulting on a proposal to require specific approval of these establishments, rather than the approach currently taken which issues generic approvals and then requires establishments to notify material changes to the activities they undertake. A move to specific approvals will have benefits, including clarity that the specific activities for which the establishment is approved have been assessed by the CA and the ability to more readily maintain a definitive list of establishments producing these products. The consultation is open for 12 weeks and will close at the end of September 2016.

“Pathway management” – controls and enforcement in food service

Advice on controls in catering settings

- 4.6 The consolidated advice published on 6 May 2016 is primarily focused on businesses in catering and food service outlets and the LAs who inspect them. The advice sets out a range of options to businesses on approaches to serving burgers that are either less than thoroughly cooked or which have the properties of a less than thoroughly cooked burger, i.e. being pink in the middle, but which have been subject to controls which mitigate the risks in other ways, such as “sear and shave”. The advice is set out in a graduated way, with thorough cooking using alternative time and temperatures as the first and simplest option, through to the more complex sets of controls that FBOs can implement.
- 4.7 For catering outlets cooking burgers less than thoroughly and where the range of controls include procedures through the supply chain to reduce the risk of contamination of the meat, the advice is clear that the business must be able to demonstrate that the processes it uses, such as cooking time and temperature, are sufficient to achieve at least a 4-log reduction in pathogens.

Use of FSA advice by enforcement officers

- 4.8 The FSA has received feedback from LAs at regional liaison meetings throughout England and Wales over the past 18 months on the advice provided on the FSA position and how this should be implemented. Initial concerns of LAs related to the adequacy of advice on the controls that can be implemented throughout the supply chain, and to the steps FBOs need to take to validate their procedures. Following the publication of provisional advice in March, August and November 2015 and consolidated advice in May 2016, which address these concerns, the feedback from LAs is now increasingly positive. LAs tell us that the consolidated advice issued on 6 May provides them with a good understanding of the level of controls expected in FBOs and where action is needed for non-compliant FBOs.
- 4.9 Since March 2015, the FSA has received intelligence from over 20 regional liaison meetings in England representing over 100 LAs in which LAs reported using the advice provided by the FSA as the basis for working with FBOs in their authorities to assess the controls in place. The FSA is not routinely notified of every case of formal and informal enforcement action taken by LAs; however seven of the regional groups in England reported that FBOs which were not able to comply had either voluntarily ceased serving burgers in this way, or LAs had taken action such as serving enforcement notices to prevent service of less than thoroughly cooked burgers where controls are inadequate.

Case study: use of FSA advice by a local authority

Action taken by Portsmouth City Council (CC) in 2015, using FSA advice as the basis for enforcement, generated national press coverage and significant interest in the enforcement community. Portsmouth CC successfully took action to prevent an FBO who had failed to demonstrate that their HACCP-based approach was sufficient and in line with the published FSA advice. The Magistrates' Court upheld the action taken by Portsmouth and found that the LA were justified in serving a Hygiene Emergency Prohibition Notice, taking the advice from the FSA into account as a fundamental part of the decision. The FBO was compelled to revert to serving burgers cooked thoroughly until such a time as they could satisfy the LA that the appropriate controls are in place for serving less than thoroughly cooked.

- 4.10 The FSA contacted LAs in June 2016 to seek feedback from the Food Hygiene Focus Group representing LAs in England and Wales. All those who responded welcomed the advice from the FSA and advised that it is a useful tool in working with FBOs and taking action where needed. LAs identified three particular issues on which they would welcome more clarity, each of which we are addressing:
- whether controls put in place by suppliers have been verified;
 - the form of messages used by FBOs at the point of ordering; and

- advice on how to achieve 4-log reductions.

4.11 The feedback from LAs will be taken into account when reviewing our advice.

Development of advice on time/temperature combinations to achieve a 4-log reduction in STEC

- 4.12 The FSA has discussed the time/temperature data for achieving a 6- or 4-log reduction in numbers of STEC⁹ with key members of ACMSF prior to a wider discussion with the Committee at their meeting on 30 June. Consideration was given to the impact of factors such as bacterial strain variation, burger formulation and visual cues and how these might contribute to the uncertainty associated with log reductions which could be achieved under real cooking conditions, particularly at temperatures below 60°C where the holding times could be very long.
- 4.13 We will be able to update the Board at its meeting on the discussions due to take place at the ACMSF meeting on 30 June. Our aim is to update the consolidated advice published on 6 May to include advice on time and temperature combinations that can achieve a 4-log reduction.

“Receptor protection” – consumer advisory statements

Developing effective messages at the point of ordering a burger

- 4.14 Building on the research carried out in 2015, the FSA commissioned further research in early 2016 to understand the extent to which, if at all, exposure to an advisory message regarding the risks of consuming beef burgers cooked less than thoroughly cooked has an impact on:
- Attitudes towards consuming less than thoroughly cooked burgers;
 - Perceptions of risk when consuming less than thoroughly cooked burgers;
 - Reported likelihood of ordering a burger served this way
- 4.15 This research also sought to explore whether particular messages had greater impact on the type of information presented. In addition, the research aimed to understand which of three test messages was perceived to provide the information most clearly and appropriately.
- 4.16 We found all three advisory statements tested have a consistent impact on respondents’ perceptions of risks and concern, reducing likelihood of ordering or eating a less than thoroughly cooked burger. All three messages were consistently highly rated on being informative, easy to understand, important for the public, and proportionate to the risk. Of these messages, the one that explained the difference between burgers and steak and the resultant

⁹ Shiga-toxin producing E. coli

difference in risk was seen by test subjects as both the easiest to understand and the most informative.

- 4.17 The FSA is next due to meet with industry representatives, LAs and colleagues from the Department of Business, Innovation and Skills on 8 July 2016 to discuss the use of this research to develop a consistent and effective approach to providing messages at the point of ordering. Following the workshop the FSA will finalise advice on the approach to consumer messages and update the consolidated advice. Further details of the research are provided in Annex 1.

Businesses with controls equivalent to thorough cooking and the requirement for messages to consumers at the point of ordering

- 4.18 The initial Board decision on the use of consumer messaging – made as part of the interim decision in January 2015 pending further research – was that any FBO serving a burger which has pink meat in the centre needed to provide messages to consumers about potential risk. This position was confirmed by the Board in September 2015.
- 4.19 The FSA position has been subject to repeated challenge by a number of key stakeholders, including the major trade associations for the catering and hospitality sector. They have questioned the effectiveness and legal basis for an advisory statement about risk in scenarios where the LA or primary authority is satisfied that controls achieve a level of risk reduction that is equivalent to thorough cooking, as recommended by the ACMSF.
- 4.20 The legal basis for information to be provided for less than thoroughly cooked burgers is provided by general food law which requires that in considering whether 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...”

- 4.21 It is not a requirement that there must be information available to consumers about risk where thorough cooking of food is considered sufficient to eliminate pathogens. Procedures which are implemented by some food service outlets now already offer equivalent level of protection to the ACMSF recommended cooking time and temperature combinations for a 6-log reduction. These include the “sear and shave” approach which involves searing a whole cut of meat prior to mincing and essentially removes contamination from the outer surface of the meat before it is turned into mince to make burgers. This approach is often used in the production of steak tartare, as seen by members of the Board during a visit to a restaurant in Cardiff in 2014. Production of steak tartare in this way does not currently require information for consumers at the point of ordering
- 4.22 We suggest that the Board considers amending the FSA position – and therefore the advice to the food industry and enforcement community – to

recognise this point. This would also help future-proof the FSA position, against innovation by the industry. For example, we are aware of others investigating the suitability of sous vide cooking of burger patties which would achieve a 6-log reduction in a product which appears pink and would be supplied to food service outlets to finish burgers off using conventional light cooking methods and provide the aesthetic and organoleptic qualities that some consumers demand.

- 4.23 An amended position would recognise that where controls deliver a 6-log reduction and therefore are demonstrably equivalent to thorough cooking, we exempt FBOs applying these controls from the need to provide a consumer advisory statement, and recommend that they provide information to consumers on the adequacy of the controls in place and the difference from home-prepared burgers where our advice remains to cook thoroughly. To deliver this information, industry representatives have proposed approaches such as the use of QR-code technology which directs consumers to the advice on the FSA website.

Advice and campaigns

- 4.24 To support design of additional effective approaches, we have reviewed the available consumer insight, which includes:
- the [consumer engagement work](#) done to inform the September Board paper,
 - previous [consumer research](#) on messaging around the risk of food poisoning,
 - reported behaviours in [Food and You](#),
 - relative levels of illness and hospitalisations attributed to various food choices.
- 4.25 We are planning a marketing campaign to enable more informed choices by consumers, allowing them to take greater responsibility for managing the food risks that are personal to them and that they can affect. Thorough cooking of burgers at home will be the first topic covered by the campaign. Our consumer segmentation work, which is based on people's attitudes to risk, is especially relevant here and will inform our media and channel selection. It is likely that we will focus on press, social media and partnerships.
- 4.26 We plan for this work to launch in August, peaking at the August Bank Holiday where previous campaign research has indicated that more than half the households in the UK plan to have or attend a barbecue. The focus of our messages will be around the things you can do to keep your family safe and an explanation of why cooking a burger is different from cooking a steak.
- 4.27 We will be tracking the reach and recall of messages alongside any reported changes in behaviour. The first consumer tracking survey is proposed in

autumn 2016, following the initial consumer campaign due to commence in August. Updates will be provided to the Board as the data become available.

Modelling effectiveness of interventions through the supply chain

- 4.28 We have carried out additional modelling to assess the impact of interventions that could be introduced in the burger supply chain, to reduce the potential contamination of meat used to produce burgers that will be less than thoroughly cooked at consumption to similar levels to those of well-done burgers.
- 4.29 Four key interventions were modelled using the outcomes from previous research and adapting the quantitative risk assessment model developed by Animal and Plant Health Agency (APHA) and referred to in the September 2015 Board paper. The FSA sought expert advice from members of the ACMSF on the interventions and results of the modelling which indicate that the two most promising interventions in terms of risk reduction are use of lactic acid and steam on carcasses.
- 4.30 Provisional results from the modelling indicates that use of lactic acid and steam on carcasses, in addition to a 4-log reduction through cooking of a ½ pound burger result in a similar or lower relative risk when compared with cooking a small burger to “well done” in the home. Whilst the associated risk is not zero, we would consider it “broadly acceptable”.
- 4.31 The analysis and results of this work will be discussed at the full ACMSF meeting on 30 June, and we will be able to provide a verbal update of the outcomes of these discussions at the July Board Meeting.

Development of triggers for review using epidemiological evidence

- 4.32 The September 2015 Board paper highlighted the need to identify measures we could use to track the impact of applying these new controls, and the trigger levels that would lead to referral of the issue back to the Board. The expectation was that this would include lab-confirmed cases of relevant foodborne pathogens.
- 4.33 Incidence rates and foodborne outbreaks of STEC and other pathogens from UK countries are reviewed twice yearly by the cross governmental Epidemiology of Foodborne Infections Group (EFIG) which also provides updates to ACMSF twice yearly. The FSA also receives weekly reports from Public Health England of exceedances for gastrointestinal pathogens and this provides early intelligence on clusters/outbreaks including those involving STEC.
- 4.34 The national gastrointestinal infection department of Public Health England (PHE) in collaboration with the PHE Food Water and Environment (FWE) laboratory and the Food Standards Agency propose are mining the national STEC enhanced surveillance system on a weekly basis for exposures that have increased beyond the expected frequency for that product / food group /

time of year. Enhanced STEC surveillance has been in place in England since January 2009 and thus constitutes a rich source of information, both in terms of exposures that were subsequently identified as vehicles of infection on further investigation, and in terms of exposures that are common in the population.

- 4.35 PHE will now use this information to calculate standard background rates of burger consumption and compare them with the observed frequency for a given reporting week. If an exceedance is triggered, a list of cases contributing to that exceedance score will be extracted from the database for further review and analysis. A summary of burger exceedances (including null reporting) and any other burger related incidents will be reported to the FSA twice a year. Individual exceedances will be reported in the week that they occur. The sources of data described above (laboratory reports, outbreak data, weekly exceedances, enhanced surveillance) should provide sufficient information to enable the FSA to refer the issue of less than thoroughly cooked burgers back to the FSA board if there is evidence of an emerging pattern or trend which is of concern. This exposure-exceedance system will be in place by September 2016. Monitoring for outbreaks that might be associated with consumption of burgers is already in place.

5 CONCLUSIONS

5.1 The Board is asked to:

- **confirm** that it is satisfied with the progress that has been made on identifying and implementing controls throughout the supply chain, and the planned future steps set out in this paper, for mitigating the risk of eating burgers served less than thoroughly cooked in food service outlets. In particular:
- advice to FBOs and LAs:
 - publication by the FSA of extensive advice on suitable controls that may be included in HACCP-based food safety management systems for FBOs throughout the supply chain, from slaughter of animals through to the preparation and sale of burgers in catering settings;
 - development of advice in conjunction with the ACMSF on time and temperature combinations capable of achieving a 4-log reduction to help LAs and FBOs apply these consistently, unless they choose to use bespoke validation of their own processes;
 - launch of a public consultation on the proposal that approved establishments should have an approval which more specifically reflects the nature of their activities;
- improved understanding of the combined impact of interventions through the food supply chain, based on advice from ACMSF;
- more consistent consumer messaging at point of ordering:

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- completion of FSA funded consumer research on the effectiveness of messages at the point of ordering and ongoing work with the industry and LAs to develop a model wording for on-menu messages;
 - communicating risks to consumers:
 - establishing a baseline for consumer awareness of the FSA messages on risk about burgers and the difference between cooking at home and eating out, which will be used to track changes in awareness;
 - development of a consumer engagement plan to ensure that consumers are aware of the advice on thorough cooking in the home and the reasons for the difference in the advice when eating in catering settings.
 - **identify** any additional steps, measures or evidence that would enhance the FSA's ability to manage the risk to consumers; and
 - **consider** and **agree** the suggestion from the food service sector that where food service establishments can demonstrate that, regardless of "source controls" in place, they have controls in place within the food service premises for the preparation of burgers that deliver the same level of protection as thorough cooking (6-log reduction), they should not need to have the same consumer messaging in place as those serving less than thoroughly cooked burgers that rely on "source controls" to meet the position adopted by the FSA Board.

ANNEX 1 – CONSUMER RESEARCH

1. Recap on previous research

1.1 We commissioned TNS BMRB to conduct qualitative and quantitative research in 2015 exploring how consumers perceive and made decisions about risky foods such as less than thoroughly cooked burgers. A typology was created as part of this research based on respondents' preferences around less than thoroughly cooked burgers, their behaviour, and how frequently they were eaten:

- Rejecters: forming the majority (64%) of burger eaters interviewed in the survey. Rejecters prefer burgers cooked well done, and would reject a burger served less than thoroughly cooked or still pink;
- Accepters: comprising 24% of burger eaters in the survey. Accepters did not have strong preferences about how their burger is cooked, but tended to accept a burger however it is served;
- Advocates: 12% of burger eaters in the survey had a strong preference for burgers served less than thoroughly cooked – often preparing less than thoroughly cooked burgers at home as well as ordering them in restaurants.

1.2 Research found that Rejecters and Advocates were less likely to change behaviour in response to messaging, but that well-framed messages could prompt some to more conscious reflection and decision making. By contrast, Accepters were more receptive to risk messaging overall. The 2015 research recommended that messaging should:

- focus on explaining the nature of the risk posed by less than thoroughly cooked burgers, challenging the misconception that steak and mince carry similar levels of risk
- include information about the likelihood of harm (perceived as key to informed decision making); but ideally not expressed as a percentage, as risk tended to be dismissed or discounted when presented in this format;
- ensure the consequences are proportional to the level of risk, as the presentation of very severe consequences alongside very low likelihood tended to be viewed as incongruous and inappropriate

2. Background to second stage of the research

2.1 We commissioned further research in early 2016 to understand the extent to which, if at all, exposure to an advisory message regarding the risks of consuming beef burgers cooked less than thoroughly has an impact on:

- Attitudes towards consuming less than thoroughly cooked burgers;
- Perceptions of risk when consuming less than thoroughly cooked burgers;
- Reported likelihood of ordering a burger served this way;

2.2 This research also sought to explore whether particular messages had greater impact on the type of information presented. In addition, the research aimed to understand which of three messages was seen to provide the information most clearly and appropriately.

2.3 To explore the potential impact of consumer advisory statements, we took an experimental approach intended to better reflect the environment in which respondents were likely to encounter the final message, and to explore any differential impact between messages.

2.4 TNS BMRB conducted an online survey with 2000 ‘Accepters’ and ‘Advocates’ of less than thoroughly cooked beef burgers.

- Accepters – those who **do not prefer burgers served rare** but would eat one if served (whether happily or with reservations) and eat rare burgers once a year or less frequently;
- Advocates – those who report **preferring burgers served rare** and eat rare burgers at least once every three months.

2.5 The sample was then split into four randomly assigned treatment groups. Three of the groups were shown a separate advisory statement, and the fourth control group was not shown a message. Table below gives further details of the messages tested.

Message	Description	Message text
1	Minced beef risks	Burgers served rare or medium carry more risk of food poisoning – particularly for vulnerable people such as children, pregnant women, the elderly and those with weakened immune systems. Unlike steak, beef for burgers gets minced together, which means bacteria on the outside get mixed inside. To help kill the bacteria and reduce your chances of getting ill, order a ‘well-done’ burger.
2	See, smell, taste	Burgers served rare or medium carry more risk of food poisoning – particularly for vulnerable people such as children, pregnant women, the elderly and those with weakened immune systems. You can’t see, smell or taste the bacteria that can cause food poisoning in burgers. But you can reduce your chances of getting ill by ordering a ‘well-done’ burger.
3	E. coli and salmonella	Burgers served rare or medium carry more risk of food poisoning – particularly for vulnerable people such as children, pregnant women, the elderly and those with weakened immune systems. Bacteria like E.coli and salmonella in burgers can cause serious illness unless they are killed during cooking. To help kill the bacteria and

		reduce your chances of getting ill, order a 'well-done' burger.
4	Control group	No message

3. Results

3.1 We found all three advisory statements have a consistent impact on respondents' perceptions of risks and concern, reducing likelihood of ordering or eating a rare burger. 70% of respondents who were not shown a message claimed that they would eat a "rare" burger if served one, compared with 54% on average of respondents shown any of the three messages who would eat a "rare burger if served one (53% – 57% across the three messages)

3.2 All three messages were consistently highly rated on being informative:

- **86% respondents agreed that message one was informative**
- **83% agreed for message two**
- **87% agreed for message three**

Easy to understand:

- **85% agreed for message one**
- **84% agreed for message two**
- **86% agreed for message three**

And considering this an important issue for the public to be aware of:

- **80% agreed for message one**
- **80% agreed for message two**
- **82% agreed for message three**

3.3 When respondents were asked to compare the three messages used **41%** felt that message one was easiest to understand, compared to **32%** and **20%** for messages two and three respectively and **39%** felt that message one was best at informing them about the risk, compared with **19%** and **35%** for messages two and three respectively.

3.4 The messages did not affect respondents' views on ordering a burger in future; 47% respondents shown any message were "very likely or "fairly likely" to order a burger next time they ate out compared with 46% for respondents shown no message. However it does appear to affect whether respondents would order the burger "rare" or "medium"; **28%** shown a message reported that they were "very unlikely" to order their next burger "rare" or "medium" compared with **20%** not shown any message.

3.5 Overall, rare burger Advocates and Acceptors were split with regards to their burger cooking preferences with similar proportions reporting a preference for rare or medium burgers as for those who prefer a well-done burger. More than a third of Acceptors and Advocates reported eating rare burgers more than once a month, although younger Advocates and Acceptors were more likely to report eating rare burgers this frequently.

3.6 The final report will be published on the FSA website in July 2016.