ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

ADVICE ON THE COOKING OF BURGERS

Introduction

1. In its Report on Verocytotoxin Producing *Escherichia coli* (VTEC) published in 1995, the ACMSF endorsed the Government's advice to cook minced beef and minced beef products including beef burgers to a minimum internal temperature of 70^{o}C for 2 minutes or equivalent. Work carried out at Campden and Chorleywood Food Research Association (CCFRA) to investigate the destruction of VTEC O157 in minced burgers at a range of temperatures reflecting those generally used in catering or in the home indicated that 70^{o}C or 2 minute or equivalent would deliver a 6 log reduction in VTEC O157.

2. The Committee also endorsed the existing guidance issued by the Chief Medical Officer in 1991 that burgers should be cooked until the juices run clear, and there were no pink bits remaining inside. The ACMSF recommended that this advice should be reconsidered when the results of the research into the formulation and colour of cooked minced meat products, the colour of juices, the temperature achieved and the survival of VTEC was available.

3. At its meeting held on 13 October 1997, the ACMSF considered a change in US advice that consumers should not rely on internal colour change but to use a thermometer to ensure beef burgers were cooked thoroughly. Members thought this advice impractical and requested to see preliminary results of Department of Health funded research undertaken by the University of Reading into the assessment of the degree of heat treatment necessary to destroy *E.coli* O157 in beef and lamb. This research found that colour change alone was unlikely to be a reliable indicator that a cooking burger had reached 70^{o}C for 2 minutes, with many burgers appearing cooked before a temperature of 70^{o}C had been reached. Colour change was influenced by type and cut of meat and the salt level present. However, the researchers found that if the manufacturers' cooking advice was followed almost all the burgers reached an internal temperature of 70^{o}C.

4. On the basis of these findings the committee revised its recommendations on the safe cooking of burgers, which subsequently formed the basis of the Chief Medical Officers revised guidance on this subject. A copy of the text from the press release with the advice, (issued July 1998), is at Annex A. The advice is directed to consumers, manufacturers and retailers, caterers and suppliers to caterers. In commercial settings the advice is that minced meat products including burgers should be cooked to a minimum temperature of 70^{o}C for two minutes or equivalent (e.g. 65^{o}C for 10 minutes, 75^{o}C for 30 seconds. No specific time/temperature requirement was

directed to consumers other than following the manufacturer's instructions and observing that these products are thoroughly cooked so that they are piping hot throughout. Research had shown that colour change in burgers during cooking was sometimes unreliable as an indicator of doneness although the advice also stressed that eating undercooked burgers, which are rare in the middle, might be dangerous.

Publications since the ACMSF advice

5. The ACMSF recommendations in this area have not been reviewed by the committee since the CMOs advice was issued in 1998. The Food Safety Authority of Ireland issued similar advice in 1999 (FSAI 1999). However, it has recently been brought to our attention by industry that the recommended time/temperature advice for burgers and other ground beef products in the UK appear to be more stringent than in the US. Where the cooking conditions can be carefully controlled they are of the opinion that the UK advice leads to overcooking and associated deterioration of the cooked product.

6. The US Food and Drug Administration recommends that ground beef be cooked to an internal temperature of 66°C for 1 min, 68.3°C for 15 sec, or 70°C for <1 sec (FDA, 1999). The US Department of Agriculture Food Safety and Inspection Service (USDA FSIS) recommends that consumers use a thermometer to ensure that ground beef is cooked to a minimum of 71.1^{o}C (USDA 2003) The USDA FSIS recognizes that cooking ground beef patties to at least 68.3°C for 15 sec is a safe option for restaurants and foodservice operations as recommended by the US Food Code (FDA, 1999).

7. The ACMSF's recommendation of 70^{o}C for 2 minutes or equivalent will deliver approximately a 6-log reduction of *E.coli* O157:H7 (ACMSF 1995; Stringer *et al*., 2000). By contrast the less stringent USDA time temperature (e.g. 68.3°C for 15 sec) would provide a 6.5 log or greater reduction for *Salmonella*, which has a similar heat resistance to *E.coli* O157:H7 (Anon. 2003). This apparent inconsistency may relate to variation in intrinsic and extrinsic factors, including strain variability, growth phase, medium composition and conditions (temperature, pH, a_w), holding period before heat treatment, heat shock and the method and nature of the heating medium (Stringer *et al.,* 2000; Rhee *et al*., 2003).

8. Cooking ground beef using different cooking methods (e.g. single sided or double sided (clam shell)) has been found to influence the survival of *E.coli* O157 and recommendations on safe cooking need to have an appropriate safety margin to account for the wide range of conditions in which burgers and other minced meat products will be prepared and cooked.

Recommendation

9. The committee is asked to comment on the current advice on the cooking of burgers and similar minced meat products and whether in light of the differences between the recommended cooking conditions in the UK and in the US the advice should be reviewed.

References

ACMSF. Report on Verocytotoxin-producing *Escherichia coli*, HMSO, London, 1995.

FSAI. The prevention of *E. coli* O157:H7 infection a shared responsibility. Food Safety Authority of Ireland, Dublin, Ireland, 1999, 53 pp.

FDA. Food Code. US Dept of Health and Human Services, Public Health Service, Food and Drug Administration. United States Department of Agriculture, Washington DC 1999.

USDA. Color of cooked ground beef as it relates t o doneness. Food Safety and Inspection Service, United States Department of Agriculture, Technical Publication, revised April 2003. www.fsis.usda.gov/oa/pubs/colortech.htm

Rhee MS, Lee SY, Hillers VN, McCurdy SM, Kang DH. Evaluation of consumer-style cooking methods for reduction of *Escherichia coli* O157:H7 in ground beef. J Food Prot. 2003; Jun; 66(6): 1030-1034.

Stringer S, George S, Peck M. Thermal inactivation of *Escherichia coli* O157:H7. J. Appl. Microbiol. Symp. Suppl. 2000; **88**: 79S-89S.

Anon. Verotoxigenic *E.coli* in foodstuffs .Opinion of the Scientific Committee on Veterinary Measures relating to Public Health, January 2003

Secretariat
September2004

Annex A: Department of Health Press release

Revised Guidance On Safe Cooking Of Burgers

Published:

Friday 31st July 1998

Reference number:

98/316

Revised guidance on the safe cooking of burgers was announced today by Sir Kenneth Calman, Chief Medical Officer.

In addition to revising existing advice to consumers, the guidance has been expanded to include guidelines to the food industry on labelling by wholesale suppliers to caterers, manufacturers and retailers. It also emphasises the need for training in catering establishments.

The changes are based on the recommendations of the Government's independent expert Advisory Committee on the Microbiological Safety of Food (ACMSF).

Sir Kenneth's advice on the safe cooking of burgers includes:

Consumers cooking burgers and similar minced meat products should follow the manufacturer's instructions. It is particularly important to ensure that burgers and similar minced meat products are thoroughly cooked so that they are piping hot throughout. Eating undercooked burgers which are rare in the middle may be dangerous;

Barbecues- the cooking process is variable and difficult to control which means it is absolutely vital to ensure that burgers are thoroughly cooked so that they are piping hot throughout;

Manufacturers and retailers- minced meat and minced meat products including burgers should be cooked to a minimum temperature of 70 degrees centigrade for two minutes or equivalent. Vendors of raw burgers should ensure that all burgers and similar minced meat products are supplied with adequate cooking instructions to comply with this recommendation. Cooking instructions should take into account factors such as whether the burger is frozen or chilled, the thickness and formulation of the burger, and the prescribed method of cooking.

The absence of pink meat in a burger after cooking is not, in itself, a guarantee that the burger has been adequately cooked, but despite its limitations it may provide an additional safety check for consumers.

It is therefore recommended that the advice to cook burgers until the juices run clear and there are no pink bits inside may be used where appropriate (eg when a burger contains only beef and no added salt) but it should always be accompanied by the other cooking instructions which achieve a minimum temperature of 70 degrees centigrade for two minutes or equivalent.

Wholesale supplies to caterers- cartons of burgers (and other similar minced meat products) supplied by wholesalers for caterers should be labelled with a clear instruction that the product must always be cooked thoroughly so that it is piping hot right through to the centre. Minced meat and minced meat products including burgers should be cooked to a minimum temperature of 70 degrees centigrade for two minutes or equivalent;

Caterers- vendors of cooked burgers and other similar minced meat products, for example caterers, have a specific legal obligation to identify and control any process steps that are critical to food safety (Food Safety (General Food Hygiene) Regulations 1005, regulation 4(3)). The thorough cooking of minced meat products, including burgers to a temperature of 70 degrees centigrade for two minutes or equivalent, will be one such critical control. Caterers must ensure that their procedures achieve this and they should take into account the type of cooking equipment, its operating temperature, the temperature of the meat at the start of cooking, its thickness and any other relevant factors.

Caterers should consider the potential for undercooked burgers to cause disease and should not provide them to customers or, if specifically requested to do so, should remind the customer of the potential hazard.

Training- verocytotoxin producing *Escherichia coli* (VTEC) infections could be significantly reduced if there was a better understanding of the need to avoid cross-contamination and to cook food properly. It is recommended that commercial food handlers focus training on methods for the safe and hygienic handling of food. Catering establishments should ensure that the staff know precisely what to do (eg the routine for safe cooking) and why it must be followed.

Notes to Editors

1. Previous advice to consumers was issued on 14 February 1991 by the then Chief Medical Officer, Sir Donald Acheson, who said that "(burgers) should be thoroughly cooked throughout...until the juices run clear and there are no pink bits inside."

2. The role of the Advisory Committee on the Microbiological Safety of Food is to provide independent expert advice to the Government. The chairman, Professor Douglas L Georgala, CBE, FIFST, was Director of the Institute of Food Research until his retirement, and is an independent scientific consultant