Advisory Committee on the Microbiological Safety of Food

Annual Report 2017

Advises the Food Standards Agency on the Microbiological Safety of Food

Contents

The Advisory Committee on the Microbiological Safety of Food (ACMSF) was established in 1990 to provide the Government with independent expert advice on the microbiological safety of food.

The Committee's terms of reference are: -

to assess the risk to humans from microorganisms which are used, or occur, in or on food, and to advise the Food Standards Agency (FSA) on any matters relating to the microbiological safety of food.

The various issues addressed by the Committee since its inception are detailed in this and previous Annual Reports[1-25] and in a series of subject-specific reports.[26-45]

Foreword

1. I am pleased to present this report which summarises the work of the ACMSF in 2017.

2. Details of membership, agenda and minutes are published on the ACMSF webpage (https://acmsf.food.gov.uk/). During 2017, the majority of the Committee's activities were carried out by subgroups (Ad Hoc Group on *Campylobacter*, Antimicrobial Resistance (AMR) Working Group and the fixed-term task and finish Group on AMR.

3. AMR was an issue the Committee and its AMR subgroups gave a lot of attention to during year. Together with the AMR Working Group we considered the Food Standard Agency's systematic review of AMR bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level. The Working Group was involved from the design stage of this study that has made many recommendations, mainly regarding the need for more research and surveillance and it has been well received by the FSA. The fixed-term task and finish group on AMR established in May 2017 to consider specific issues relating to AMR in the food chain met 5 times during the year. Their deliberations included receiving evidence from a number of UK food animal production sectors. Output of their work is expected to be available by January 2018.

4. We reviewed a draft risk assessment in relation to *Mycobacterium bovis* transmission via meat and meat products. Our discussions concluded that the overall risk of *M. bovis* infection via meat and meat products can be considered as negligible with a medium level of uncertainty, on the basis of existing TB controls including post mortem examination.

5. Following the discussions we had in 2016 on the subject of changes to plant protection products and biocide maximum residue limits (MRLs), the FSA updated us on the proposed amendment of chlorate MRLs, the development of a procedure for setting biocide MRLs and the finalisation of the legal definition for endocrine disrupting chemicals. We agreed with the FSA's concerns about the potential impacts on microbiological safety if the use of disinfection and sanitation products were to be restricted through the setting of MRLs at too low a level or

by a total ban on the use of certain active substances. We welcomed the opportunity to consider setting up a cross Scientific Advisory Committee working group to facilitate a full discussion on this issue.

6. The Committee was updated on the outcome of the Epidemiology of Foodborne Infections Group (EFIG) activities. EFIG updates covered a number of topics which included: reports of *Salmonella* from livestock species not subject to *Salmonella* National Control Plans and Trends in laboratory reports for *Salmonella*, *Campylobacter*, *Listeria monocytogenes* and *E. coli* O157 in humans.

7. Looking to the future, in addition to the aforementioned output from the fixed-term task and finish group on AMR, the Ad Hoc Group on *Campylobacter* is expected to present its comprehensive review at our January 2018 plenary meeting. This report would be subject to public consultation.

8. I should like to thank Members of the Committee and its Working and *Ad Hoc* Groups, without whom the ACMSF would not operate effectively, as well as the many other individuals and organisations that have helped the Committee in our work in 2017. On behalf of the members of ACMSF, I would also like to place on record our thanks to Professor Sarah O'Brien who has chaired the ACMSF for the last decade, providing considerable expertise, advice and guidance in the development and delivery of advice to FSA. She has helpfully agreed to continue chairing the *Campylobacter* subgroup until the group delivers its report.

Professor David McDowell
Acting Chair

Introduction

1. This is the twenty-sixth Annual Report of the Advisory Committee on the Microbiological Safety of Food and covers the calendar year 2017.

Chapter 1: Administrative Matters

Membership

Appointments

2. Appointments to the ACMSF are made by the FSA, after consultation with United Kingdom Health Ministers (i.e. the "Appropriate Authorities") in compliance with Paragraph 3(1) of Schedule 2 to the Food Standards Act 1999. The Agency has resolved that appointments to the ACMSF should be made in accordance with Nolan Principles[46], the guidance issued by the Office of the Commissioner for Public Appointments (OCPA)[47] and the Government Office for Science Code of Practice for Scientific Advisory Committees[48]. The FSA is not bound to follow OCPA guidance, as ACMSF appointments do not come within the remit of the Commissioner for Appointments and the guidance applies only to appointments made by Ministers. However, although ACMSF appointments are not made by Ministers, the Agency has decided that it would nevertheless be right to comply with OCPA guidance as best practice.

Periods of appointment

3. To ensure continuity, appointments to the ACMSF are staggered (usually for periods of 2, 3 or 4 years) so that only a small proportion of Members require to be appointed, re-appointed or retire each year.

Spread of expertise

4. A wide spectrum of skills and expertise is available to the ACMSF through its Members. They are currently drawn from commercial catering, environmental health, food microbiology, food processing, food research, food retailing, human epidemiology, medical microbiology, public health medicine, veterinary medicine, and virology. The Committee also has one consumer Member.

5. Members are appointed on an individual basis, for their personal expertise and experience, not to represent a particular interest group.

Appointments in 2017

6. Four members were appointed to the Committee in 2017: Dr Rohini Manuel (to provide expertise in clinical microbiology), Dr Gwen Lowe (to provide expertise in public health medicine), Mrs Emma Hill (to provide expertise in commercial catering) and Mrs Heather Lawson (to provide food enforcement law expertise).[49]

Re-appointments in 2017

7. The periods of appointments for Dr Gary Barker and Mr David Nuttall expired on 31 March 2017 and they were re-appointed for further 4 years and 3 years respectively from 1 April 2017.

Committee and Sub-Group meetings

8. The full Committee met once in 2017 and the meeting was chaired by Professor Sarah O'Brien.

9. The *Ad Hoc* Group on *Campylobacter* (Chair: Professor Sarah O'Brien) met four times in 2017. See paragraph 62 for issues considered at the group's meetings.

10. The Working Group on Antimicrobial Resistance (Chair: Professor David McDowell) met once in 2017. Overview of the group's meetings is available at paragraph 63 to 79

11. The fixed-term task and finish group on AMR (Chair: Professor David McDowell) had five meetings in 2017 (see paragraph 80).

Current membership and Declarations of Interests

12. Full details of the membership of the Committee and its Working and *Ad Hoc* Groups are given in Annex III. A Register of Members' Interests is at Annex IV. In addition to the interests notified to the Secretariat and recorded at Annex IV, Members are required to declare any direct commercial interest in matters under discussion at each meeting, in accordance with the ACMSF's Code of Practice (Annex V). Declarations made are recorded in the minutes of each meeting.

Personal liability

13. In 1999, the Secretary of State for Health undertook to indemnify ACMSF Members against all liability in respect of any action or claim brought against them individually or collectively by reason of the performance of their duties as Members (Annual Report 1999[8] paragraph 6 and Annex III). In 2002, the Secretariat asked the FSA to review this undertaking, given the fact that, since 2000, the ACMSF had reported to the FSA where previously it had reported to UK Health Ministers. In March 2004, the Food Standards Agency gave a new undertaking of indemnification in its name, which superseded the earlier undertaking given by the Secretary of State (see Annex IV of 2004 Annual Report[14]).

Openness

Improving public access

14. The ACMSF is committed to opening up its work to greater public scrutiny. The agendas, minutes and papers (subject to rare exceptions on grounds of commercial or other sensitivity) for the full Committee's meetings are publicly available and are posted on the ACMSF website. Also, on the Committee's website are summaries of meetings of the Working and *Ad Hoc* groups. ACMSF's website can be found at:

    http://acmsf.food.gov.uk/

15. The Committee also has an e-mail address

    acmsf@foodstandards.gsi.gov.uk

16. In accordance with the Freedom of Information Act 2000, ACMSF has adopted the model publication scheme which sets out information about the Committee's publications and policies.

Open meetings

17. Following the recommendations flowing from the FSA's Review of Scientific Committees[50], the ACMSF decided that from 2003 onwards all its full Committee meetings should be held in public.

18. The plenary meeting that took place in 2017 was held in Aviation House, the FSA's London Headquarters.

19. ACMSF open meetings follow a common format. Time is set aside following the day's business for members of the public and others present to make statements and to ask questions about the ACMSF's work. The names of participants, the organisations they represent, and details of any statements made, questions asked and the Committee's response, are recorded in the minutes of the meeting.

Work of the other advisory committees and cross-membership

20. The Secretariat provided Members with regular reports of the work of other Scientific Advisory Committees advising the FSA in 2017. Professor Sarah O'Brien (who retired from the Committee in March 2017) is a member of the FSA's newly established Science Council. She serves on the National Expert Panel on New and Emerging Infections (NEPNEI). Professor David McDowell and Dr Gary Barker are members of the Cross-SAC Working Group on the framework for foods that present an increased risk per serving. Mrs Joy Dobbs Deputy Chair of the Social Science Research Committee is an Ex-Officio on ACMSF.

Professor Stephen Forsythe member of the Advisory Committee on Animal feedingstuff is a member of the ACMSF Working group on Antimicrobial Resistance.

Chapter 2: The Committee's Work in 2017

A systematic review of AMR bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level

21. This above study funded by the Food Standards Agency and carried out by the Royal Veterinary College (RVC) was published in November 2016. The Committee through the ACMSF AMR subgroup was consulted at the design stage of the study. The Committee was provided with background information[51] on the significance of the study and why the FSA funded it.

22. Dr Ana Mateus of the RVC gave a presentation on the study. She outlined the objectives and methods used in the systematic review. The scope of the review was literature and scientific studies between 1999 and May 2016, focussing on 4 critically important antimicrobials, as defined by the WHO: β-lactams (including carbapenems), fluoroquinolones, macrolides, and polymyxins (colistin). 304 studies were selected for further study out of a potential 6,000. Only 32 of these 304 had conducted random (probabilistic) sampling so that in most of the studies there was a high risk of bias due to the lack of representative data.

23. Recommendations from the study include (in no particular order of importance):

    - Standardization in the selection of antimicrobials for antimicrobial susceptibility testing (AST) panels as recommended by EFSA[53], the use of epidemiological cut-off values (ECOFFs) for surveillance of resistance, adoption of a standardized definition for multi-drug resistance (MDR), the adoption of random sampling and adequate study design for epidemiological studies and when implementing surveillance systems for determination of AMR in the food chain as previously recommended in the ACMSF report published in 1999[54] .

    - Surveillance priorities could be set using a risk-based approach, taking into account the importance of antimicrobials used for treatment in both humans and animals, and continued surveillance of the prevalence and emerging resistance (including MDR) in commensal bacteria also important.

    - There is scarce evidence of AMR and MDR occurrence in dairy, fresh produce and seafood to several antimicrobials in commensal bacteria. These gaps should be addressed using a risk-based approach taking also into account the extent of expected consumer exposure using consumption and import volumes.

- Efforts should be made to continue to monitor AMR and MDR trends in *Campylobacter* spp. strains and commensal bacteria from both imported and domestically-produced poultry meat in the UK; differentiation should be made for different types of poultry meat sampled (i.e., chicken and turkey meat) due to variations observed in farming management practices across species.

- Research and surveillance are needed to monitor AMR and MDR in pathogenic and commensal bacteria from imported and British pork meat in the UK.

- Data on antimicrobial use and type of production systems in food-producing animals should be collected for food samples in order to explain the occurrence and dynamics of AMR, resistance genes and MDR phenotypes in in the UK.

- There is a need for more studies to quantify the contribution of both domestic and imported foods to the occurrence of AMR. Information on country of origin for imported products should be collected.

- Finally, further research and surveillance are needed to establish and quantify the risk of transmission to humans of AMR to critically important antimicrobials (CIAs) in organisms from foods of both animal and non-animal origin.

24. The following points were raised by the Committee in discussion:

- The review showed that data on AMR in food was in many cases either insufficient or absent, and sample sizes were too small to be meaningful. There was an urgent need for studies with scientific rigour with appropriate sample sizes. There was support for the recommendations in the review for further research and surveillance.

- It was important that comparable data with the rest of the world was collected. There was a suggestion that programmes of research across the whole of Europe were needed in order to better understand the situation of AMR in the food chain.

- There is little data on AMR in pathogens and the role of commensals in the spread of AMR.

- In order to assess the risk, in the context of transmission through food poisoning, it was important to know the levels as well as the presence of AMR bacteria in food and how much AMR there is in our food on a daily basis.

- Surveillance data needs to be focussed so that it can be linked to clinical practice and treatment of patients.
- It was not known how the balance of trade between the EU and third countries would change in the light of exiting the EU.

25. The Chair of the AMR Working Group informed Members that the Group had expressed their views to the FSA on the systematic review.

26. The final report of this work can be accessed on the FSA website at: https://www.food.gov.uk/science/research/foodborneillness/b14programme/b14projlist/fs102127/a-systematic-review-of-amr-in-pork-and-poultry-dairy-products-seafood-and-fresh-produce

Mycobacterium bovis and possible health risks associated with meat

27. Dr Manisha Upadhyay presented a draft risk assessment in relation to *M. bovis* transmission via meat and meat products [55]. When considered previously, the ACMSF had classified the risk as "very low". The Committee reviewed the risk of *M. bovis* transmission via meat in 2001, 2003 and 2010 considering new information at each point and agreed a risk level classification of very low on each occasion. In 2012, the Committee agreed that the most appropriate risk level classification system and means to assess uncertainty for future risk assessments should be the approach agreed by the European Food Safety Authority (EFSA) in 2006.

28. In October 2013, the Agency requested that the Committee reviews the risk of *M. bovis* infection via meat incorporating the risk level classification system it had agreed in 2012 in order to provide consistency in terminology for the purposes of risk communication.

29. The draft qualitative risk assessment followed a risk assessment framework similar to the assessments presented to the Committee on several occasions in recent years. The assessment was not an exhaustive review but it focussed on key aspects.

30. Given that *M. bovis* prevalence is markedly higher in UK cattle than other food producing animals which tend to function as spillover hosts for *M. bovis*, the assessment focusses on bovine meat, though there is mention of other meat producing animals.

31. The risk assessment used EFSA's approach to risk ranking (agreed by the Committee in 2012) as below in order to classify the level of risk:

Risk Level Classification

Probability Category	Interpretation
Negligible	So rare that it does not merit to be considered
Very Low	Very rare but cannot be excluded
Low	Rare, but does occur
Medium	Occurs regularly
High	Occurs very often
Very High	Events occur almost certainly

Table from EFSA (2006) modified from OIE (2004)

Based on this approach, the Agency's estimation of the microbiological health risk related to *M. bovis* via exposure to meat and meat products is **negligible.** A medium level of uncertainty has been assigned to this assessment, based largely on two key uncertainties[1]:

32. Although a small amount of *M. bovis* contaminated meat may enter the food chain, despite rigorous *ante-mortem* and *post-mortem* inspection of animals and carcasses, the actual level of consumer exposure to *M. bovis* from eating less than thoroughly cooked or cured meat remains an **uncertainty (medium).** Thorough cooking of meat and meat products such as sausages etc. will effectively destroy any viable *M. bovis*.

33. The possibility of cross-contamination from meat infected with *M. bovis* via unhygienic or inappropriate handling either in the slaughterhouse or in a domestic or catering environment cannot be excluded and the impact of cross-contamination on *M. bovis* transmission can be flagged as an **uncertainty (medium).**

34. It was noted that the risk estimation derived from this assessment using EFSA's risk level classification approach appears to be lower than that agreed by the Committee over the years. It was explained that this does not imply a change in risk level, but reflects that a different approach has been used to estimate the risk; an approach that has been agreed and adopted by the Committee in more recent years.

35. The Committee was asked:

- To comment on the draft risk assessment
- To advise whether it is in agreement with the Agency's conclusion that the health risk related *M. bovis* via meat is **negligible**
- To provide comments on uncertainty if it wishes to do so.

Uncertainties have been identified as medium level on the basis of limited information relating to level of exposure to *M. bovis* from eating contaminated rare, raw or cured meat and the inability to exclude potential cross-contamination from *M. bovis* infected meat as a route of transmission. This information was balanced against relatively robust information to suggest that meat borne transmission of *M.bovis* is not significant

36. Members made the following comments on the paper and a number of editorial suggestions:

- It was suggested that the draft should clarify that the assessment outcome was dependent on existing TB control measures in the UK and that in other parts of the world the situation may be different because of less rigorous control measures.
- The risks from cooked meat would be lower than with raw, rare or cured meat. Members suggested that the risks should be classified separately for cooked and raw meat. (The paper had addressed this by expressing a higher level of uncertainty for less than thoroughly cooked meat.)
- The assessment should stress the importance of the dose/response relationship in the risk characterisation section because the infectious dose is high so it may be possible to identify those that are at higher risk and lower risk.
- Members mentioned that it is not helpful to compare milk and meat in terms of *M. bovis* risk because the foods are very different as are the risk assessments (more milk than meat is consumed by babies and children example).
- There was a need to take account of the likelihood of infection being present in skeletal muscle of a meat inspected animal compared to the milk of an animal on the farm, though members acknowledged the risk assessment did draw attention to the likelihood of muscle contamination being low. Anatomical likelihood is important as well as the process of heating/cooking of the food.

37. A small group of members agreed to work with the secretariat to agree a form of wording to reflect the Committee's discussions. This was done and finalised assessment can be found in paper ACM/1261.

Changes to plant protection product and biocide MRLs: potential impact on food safety

38. Dr David Mortimer (FSA Food Policy) was invited to update the Committee on progress concerning several inter-related negotiations including the amendment of chlorate MRLs (first tabled by the Commission in 2015), the development of a procedure for setting biocide MRLs (under consideration since 2013) and finalisation of the legal definition for endocrine disrupting chemicals (EFSA opinion was published in 2013), all of which could impact on the availability and use of disinfection products for food and feed processes[56]. Dr Mortimer pointed out that the lead government departments on the above subjects were the Department of Environment, Food and Rural Affairs and the Health and Safety Executive.

39. ACMSF had been alerted to the issue of changes to MRLs for two quaternary ammonium compounds (QACs), which are used as

disinfectants/sanitisers in the food industry, and about negotiations on chlorate (a contaminant in chlorine-based sanitisers) and biocidal actives at previous Committee meetings held October 2015 and January 2016. The Committee had agreed to the FSA's suggestion to setup a cross Scientific Advisory Committee working group to facilitate a full discussion, although this had been put on hold by the Agency in order to clarify the remit of the working group.

40. Concerning the new MRLs that came into force in late 2014 for QACs, members noted that the FSA has not received any reports from the food industry highlighting specific problems arising from restrictions in the use of QACs due to the low MRLs.

41. Dr Mortimer reported that the Commission's original proposal for revised chlorate MRLs had attracted a number of comments, notably that they were too low and too complex, but there was no consensus amongst Member States and the Commission had not come back with a fresh proposal. The Committee agreed with the FSA's concerns about the potential impacts on microbiological safety if the use of chlorine-based sanitisers were to be restricted, the difficulties in controlling chlorate levels in potable water used for processing and the possible high rate of non-compliance of a wide range of foods if MRLs were set at too low a level.

42. On the Interim Procedure for Setting Biocide MRLs which has been under consideration since 2013, the Committee noted that there have been several revisions to the Commission's proposed procedure. Dr Mortimer explained that, although the Commission favours a proportionate and risk-based approach with MRLs for active substances being established under contaminants regulations, a number of Member States prefer the hazard-based approach in line with that taken for pesticides.

43. Following the update, the Committee observed that there is not yet a consensus among Member States on the proposal for revised chlorate MRLs, or on the process for setting biocide MRLs and that the EU proposals on criteria for endocrine disruptors are still under discussion. Members agreed with the FSA's concerns about the potential impacts on microbiological safety if the use of disinfection and sanitisation products were to be restricted through setting MRLs at too low a level or by a total ban on the use of certain active substances.

44. The Committee agreed to explore the availability of evidence in relation to microbiological food safety that can be employed by the FSA to underpin its position in its negotiation with other Member States and the European Commission. A few members (led by Dr Dan Tucker) were asked to meet to suggest the types of data that would be available that might show that changes are occurring in process hygiene control systems. However, the investigations the group carried out was proved unfruitful.

45. ACMSF members welcomed the opportunity to be involved in any forthcoming FSA stakeholder meeting on this subject, along with the Pesticide Residue in Food (PRIF) Expert Committee. The Committee requested further updates on this issue.

Epidemiology of Foodborne Infections Group (EFIG)

46. Dr Manisha Upadhyay updated the Committee on the activities of EFIG[57]. Her report included trends in animal and human data for quarters 1-3 of 2016, an update on the National Control Programmes for *Salmonella* in chickens, an overview of an ongoing Health Protection Scotland study "Estimating the burden of gastrointestinal disease in Scotland: new opportunities using data linkage" and updates on the *Campylobacter* retail survey and food surveillance in UK.

47. Dr Upadhyay reported that provisional data between January and September 2016 reports of *Salmonella* in livestock fell by 10% in comparison to January – September 2015 and by 14% in comparison to January – September 2014. There were four reports of *S*. Enteritidis compared with 13 during January – September 2015 and six during January – September 2014. Reports of *S*. Typhimurium and the monophasic strain *Salmonella* 4,5,12:i:- increased (by 5% and 21% respectively) during January – September 2016 compared with the equivalent period of 2015, but reports of *Salmonella* 4,12:i:- decreased (by 49%). Dr Upadhyay also reported on the top serovars in different species. The most commonly reported phage types of *S*. Typhimurium were DT2, U288 and DT104 which made up 20%, 16% and 15%, respectively, of *S*. Typhimurium reports during January – September 2016. Phage type DT193 was the most commonly reported phage type for both *Salmonella* 4,5,12:i:- and *Salmonella* 4,12:i:- (87% and 92%, respectively). Trends in laboratory reports of human infections for quarters 1-3 of 2016 revealed:

- 7063 reports of non-typhoidal *Salmonella*, an increase of 5.7% from the 6660 reported in quarters 1-3 2015. An increase in the reporting rate was seen in all constituent countries. The overall number of reported infections increased in the UK by 403, the majority of which (304) were in England. The increase is due partly to an increase in *S*. Typhimurium. It was highlighted that due to a change in laboratory reporting, data for 2015 and 2016 for England and Wales now include untyped *Salmonella* spp.

- Reporting rate for *Campylobacter* has decreased in the UK from 94.2 per 100,000 population in quarters 1-3 of 2015 to 89.1 per 100,000 in quarters 1-3 in 2016. The rate of reported *Campylobacter* infections in England and Scotland have decreased to the lowest rate reported in the last ten years. Wales reported a decrease from quarters 1-3 2015 to 2016, however still reports the highest rate of all UK countries (112.3 per 100,000 population).

Northern Ireland continues to report rates lower than the rest of the United Kingdom.

- Changes in relation to STEC O157 incidence were highlighted such as incidence increase in 2016 after a decrease between quarters 1-3 2014 and 2015. Increases were seen in England (64 cases), Scotland (21 cases) and Northern Ireland (25 cases). The reporting rate in Wales is consistent with 2015. It was noted that PHE has applied the Farrington flexible algorithm to the national enhanced surveillance system reported by STEC cases between 2009 and 2015 to detect exceedances in exposures reported by cases. This was presented to the FSA in November 2016 and will complement the existing process of alerting the FSA to outbreaks linked to rare burgers that are reported to PHE. This system will require a period of piloting under the guidance of PHE statisticians and the colleagues at the University of Warwick.

- In quarters 1-3 2016, 31 foodborne outbreaks were reported to eFOSS in England and Wales and to Health Protection Scotland. There were no foodborne outbreaks reported from Northern Ireland during the period. There were 848 cases (374 of which were laboratory confirmed), and 94 reported hospitalisations.

48. From the human data update members noted that the number of human Campylobacteriosis cases appears to continue to be dropping (it has decreased to the lowest rate reported in the last ten years). Wales reports the highest rate of all the UK countries. Members requested that future presentations be accompanied by relevant information that can help in clearly understanding these data such as looking at the details of cases at country level and England cases from a regional perspective.

ACMSF Working and *Ad Hoc* Groups

Ad Hoc Group on *Campylobacter*

49. The above group met four times in 2017. They are working towards presenting a draft version of their report to the full Committee at the January 2018 meeting. The topics to be covered in the report include:

- *Campylobacter* biology and tools for detection
- *Campylobacter* genetics and genomics
- Epidemiology of *Campylobacter* in humans
- Source attribution of human campylobacteriosis
- Risks in the food chain: Poultry
- Risks in the Food Chain: Measures to prevent Campylobacter contamination of chicken meat in Europe, New Zealand and the USA
- Risks in the food chain: Red meat, raw milk and fresh produce

- People's attitudes and behaviours regarding risk (includes consumers, caterers, farmers and the food processing industry)
- How new knowledge influences risk assessment
- Conclusions and recommendations

Antimicrobial Resistance Working Group

50. The Antimicrobial Resistance (AMR) Working Group met once in 2017. It was at this meeting held in March that the group agreed to the FSA's proposal to establish a fixed-term task and finish group on AMR (see details below). Other issues considered at March meeting are outlined below.

EFSA/EMA opinion to reduce overall need of use of antimicrobials

51. The co-chair of the EU Working Group on the Reduction of the need to use antimicrobials in food-producing animals (RONAFA) provided the outcome of RONAFA's review. Members were informed that the subject of the use of antimicrobials in food producing animals started in 2013 via a self-tasking group set-up by EFSA. This evolved through a mandate (by European Commission) to EFSA and the European Medicine Agency (EMA) for a joint opinion on measures to reduce the need to use antimicrobial agents in animal husbandry in the EU and the resulting impact on food safety. The opinion was adopted by EFSA BIOHAZ panel and EMA CVMP (Committee for Medicinal Products for Veterinary Use) in December 2016 and published in January 2017.

52. It was reported that RONAFA had 5 terms of reference (ToR 1: Review measures to reduce the use of AM; ToR 2: Assess the impact of such measures on AMR); ToR 3: Review measures to reduce the need to use AM; ToR 4: Assess the impact of such measures on AMR; ToR 5: Recommend options to reduce antimicrobial use in the EU.

53. Members noted that to assist in the formulation of the opinion RONAFA reviewed published information available on specific measures applied by Member States (MSs), available data on the sale and use of antimicrobials in food-producing animals, including circumstances and diseases where antimicrobials are most intensively used, AMR surveillance data and scientific publications. Additional information was also collected through questionnaires to stakeholders and evidence from external experts. The focus of the study was on cattle, pig and poultry production systems, other food-producing species were also considered where information was available.

54. Concerning the list of recommended options it was stated that 11 options were recommended for consideration with the proviso that no single measure was sufficient to have a significant impact on AMR and that the options be implemented in an integrated approach and according to the local circumstances.

55. Recommendation also discussed the need for monitoring: to develop harmonised systems for monitoring antimicrobial use and AMR in humans, food producing animals and food (ideally at farm species/species/production stage levels).

56. On the next steps it was highlighted that ECDC, EFSA and EMA have a new mandate to produce (by the end of 2017) an opinion on a list of outcome indicators as regards surveillance of AMR and antimicrobial consumption in humans and food-producing animals. This would be used to monitor antimicrobial usage.

57. Members welcomed RONAFA's report, commented on it and agreed to consider the implication from a UK perspective and relate their views to the universal trends.

Establishing a short-term task on AMR

Proposed ToR, handling and specifics

58. As part of the FSA's new strategic approach to surveillance on AMR, the group discussed and agreed to the FSA's proposal to establish a short-term "task-and-finish" on AMR. Members considered the draft terms of reference, proposed membership, timescale and structure of the meetings and expected output.

Terms of reference

59. *To identify research questions and potential approaches which would (i) decrease uncertainty about any linkage between use of antimicrobials in food production, the incidence of antimicrobial resistance in pathogens and commensals in food production, and the growing AMR-related public health burden, and (ii) allow us to model the impacts of changes in use of antimicrobials in food production. Poultry, sheep, cattle and pigs will be covered in the scope.*

Proposed membership and observers

60. Members agreed with the proposal to build on existing membership of the group by co-opting additional expertise outside of ACMSF.

Timescale

61. Members noted that the FSA envisage the work "short term task and finish on AMR" to last for about 9 months. The group met 5 times between May and December.

Structure of the meetings and expected output

62. Members agreed with the FSA's proposal that meetings of the group will focus on delivering the terms of reference. For each meeting the FSA proposed that a session is devoted to receiving information from relevant stakeholders from the poultry, pig, cattle and sheep industries, invited to present evidence to the group, in addition to written evidence where this cannot be done.

63. Member noted the FSA's expectation that the work of the group will result in the development/enhancement of a conceptual model incorporated within a report/paper of the group's findings which will contain any recommendations. The report will be presented to the full ACMSF.

Update on recent activities relating to AMR

64. Members were updated on the outcome of the Codex Alimentarious working group on AMR met in London from 29 November to 2 December 2016. The working group was hosted by the UK and co-chaired by the USA and Australia. It was reported that the issues considered included:

- Proposal for new work on the revision of the Code of Practice to Minimise and contain Antimicrobial Resistance and
- Proposal for new work on the Guidance on Integrated Surveillance of Antimicrobial Resistance

65. The group noted the publication of the FSA risk assessment on MRSA with focus on LA-MRSA in the UK food chain (published in February 2017). The group commented on the report when it was being drafted.

66. Highlights of the recent **Defra Antimicrobial Resistance Coordination** meeting was drawn the group's attention. These include:

- The resurgence of *S*. Typhimurium DT104 (that carries pentavalent resistance) in sheep, cattle and horses. Farmers have been made aware of the increasing number cases. APHA carrying out enhanced surveillance
- Active occurrence of ESBL *E. coli* in livestock
- Consideration of consumption data in relation to the use of fluoroquinolone in the poultry sector
- AMR in companion animals
- *Salmonella* Oslo in horses (no food chain issues)
- EFSA opinion on AMR in milk

Fixed-term task and finish group on AMR

67. The above group met five times in 2017. To carry out their task the group developed a food chain focussed AMR systems map considering a wider AMR systems map developed by Department. of Health, Public Health England, Department for Environment, Food and Rural Affairs and the Veterinary Medicines Directorate in 2014. This map guided the discussions and activities of the group, and they identified eight main reservoirs with a potential AMR impact relevant to FSA, which were subsequently reviewed within the group's report. As part of this review

process, the group also received presentations on antibiotic usage and AMR from a number of UK food animal production sectors poultry meat, pigs, dairy and beef cattle, sheep. The fish, gamebird and egg sectors were not formally considered by the group. Output of their deliberations is expected to be produced at the January 2018 meeting.

Cross-SAC Working Group on the framework for foods that present an increased risk per serving

68. The Committee noted that the above group set up in February 2016 to advise the FSA through advice to the FSA's Chief Scientific Adviser and Director of Policy, on a framework for the assessment of foods which may present an increased likelihood of harm had completed its task. The group has produced a revised framework for developing proportionate controls for risky foods which was presented to the FSA Board in November 2016. The update highlighted the important revisions from the previous draft seen by the FSA Board. These include: three clear criteria to identify risky foods for consideration using the framework and a new screening stage to assess whether a food should be assessed as a risky food using the framework (and if it not, what other information or action is needed). Members noted that majority of the examples covered in the framework relates to microbiological risks. It was confirmed that this revised framework will be reviewed after two years and the trigger for review could be a recognised change in the number of cases of foodborne infections.

Outcome and Impact of ACMSF advice

69. Feedback on the outcome of ACMSF recommendations are provided to the Committee through matters arising papers, information papers and oral updates at meetings.

70. In 2017, the majority of the Committee's activities took place at subgroup level. The full Committee met once during the year. The Ad Hoc Group on *Campylobacter* and the fixed-term task and finish group on AMR (created from the AMR Working Group) who are working towards producing reports in 2018 together had 10 meetings.

71. The AMR Working Group were involved at the design and finalisation stages of the FSA's systematic review of AMR bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level. The review that made many recommendations, including the need for more research and surveillance, suggestions which have been well received by the Agency. As a result of this study there are ongoing AMR surveillance in *Campylobacter* in chicken and *Salmonella* in pork sampled at retail. This surveillance study will help fill evidence gaps and provide a baseline for further ongoing surveillance in this area. Data on AMR in retail chicken and pork will inform AMR risk assessment in the food chain.

72. The Committee was asked to assess a draft risk assessment in relation to *M. bovis* transmission via meat and meat products. Comments made by the Committee and a small group of members who volunteered to assist in finalising the risk assessment (outside of the plenary meeting) were taken into account in agreeing the overall risk from *M. bovis* to UK consumers.

73. The Committee via three of its members has contributed to the work of the cross-SAC Working Group on the framework for foods that present an increased risk per serving. The group have produced a revised framework for developing proportionate controls for risky foods which was presented to the FSA Board in November 2016. The revisions in this framework include: three clear criteria to identify risky foods for consideration using the framework and a new screening stage to assess whether a food should be assessed as a risky food using the framework (and if it not, what other information or action is needed). Majority of the examples covered in the framework relates to microbiological risks. The framework can be found at:

https://www.food.gov.uk/sites/default/files/fsa161107.pdf

Information papers

74. The ACMSF is routinely provided with information papers on topics which the Secretariat considers may be of interest to Members. This affords them the opportunity to identify particular issues for discussion at future meetings. Among the documents provided for information during 2016 were:

NO. OF PAPER	NAME OF PAPER	MEETING NUMBER	DATE OF MEETING
ACM/1247	ACMSF Work plan	90th	26 January 2017
ACM/1248	Update from other Scientific Advisory Committees	90th	26 January 2017
ACM/1249	Items of interest from the literature	90th	26 January 2017
ACM/1250	FSA Board Paper: Developing proportionate controls for risky foods	90th	26 January 2017
ACM/1251	9th meeting of the Global Microbial Identifier	90th	26 January 2017
ACM/1252	Zika virus: risk assessment related to exposure via the food chain food	90th	26 January 2017

Chapter 3: A Forward Look

Future work programme

75. The Committee will keep itself informed of developing trends in relation to foodborne disease through its close links with the FSA, Food Standards Scotland and Public Health England. We will continue to respond promptly with advice on the food safety implications of issues referred to the Committee by the FSA.

76. The *Ad Hoc* Group on *Campylobacter* setup to evaluate the outcomes to date from the second report on *Campylobacter* (published in March 2005) is working towards producing a report in 2018 that will advise the FSA in its strategy for reducing foodborne illness in relation to *Campylobacter*.

77. The fixed term antimicrobial resistance task and finish group established to look at antimicrobials and AMR in food production with particular reference to the activities and responsibility of the FSA has been given a 9-month mandate to produce its report that will be considered at the Committee's plenary meeting scheduled for 25 January 2018.

78. The Committee, through its standing Surveillance Working Group, will continue to provide advice as required on the Government's microbiological food surveillance programme and any other surveillance relevant to foodborne disease.

79. The Working Group on emerging pathogens will keep a watching brief on developments concerning the risks to human health from newly emerging or re-emerging pathogens through food chain exposure pathways.

80. Details of the Committee's work plan for 2017/18 can be found at Annex II.

Annex I

Papers Considered by ACMSF in 2017

NO. OF PAPER	NAME OF PAPER	MEETING NUMBER	DATE OF MEETING
ACM/1241	Matters arising	90th	26 January 2017
ACM/1242	A systematic review of AMR bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level	90th	26 January 2017
ACM/1243	*Mycobacterium bovis* and possible health risks associated with meat	90th	26 January 2017
ACM/1244	Changes to plant protection product and biocide MRLs: potential impact on food safety	90th	26 January 2017
ACM/1245	Epidemiology of Foodborne Infections Group	90th	26 January 2017
ACM/1246	Dates of future meetings	90th	26 January 2017
ACM/1247	ACMSF Work plan	90th	26 January 2017
ACM/1248	Update from other Scientific Advisory Committees	90th	26 January 2017
ACM/1249	Items of interest from the literature	90th	26 January 2017
ACM/1250	FSA Board Paper: Developing proportionate controls for risky foods	90th	26 January 2017
ACM/1251	9th meeting of the Global Microbial Identifier	90th	26 January 2017
ACM/1252	Zika virus: risk assessment related to exposure via the food chain	90th	26 January 2017

Annex II

ACMSF Forward Work Plan 2017/18

Last reviewed January 2017

This work plan shows the main areas of ACMSF's work over the next 12 to 18 months. It should be noted that the Committee must maintain the flexibility to consider urgent issues that arise unpredicted and discussions scheduled in the work programme may therefore be deferred.

ACMSF Terms of reference

To assess the risk to humans of microorganisms which are used, or occur, in or on food, and to advise the Food Standards Agency on any matters relating to the microbiological safety of food.

	Topic	Progress	Expected Output
1	**Horizon scanning** In October 2016 the Committee revisited the outcome of the January 2015 horizon scanning workshop for members to reassess the identified emerging microbiological issues of concern and ranked issues in terms of strategic priority and urgency.	In November 2015 Members setup an Ad Hoc group on Campylobacter as it was felt this pathogen needed immediate attention. The group is working towards producing a report by Summer 2017. Following deliberations (at the October 2016 ACMSF meeting) on the outcomes from the January/June 2015 horizon scanning discussions members agreed to setup two groups to consider the following topics:	***Campylobacter*:** ACMSF's update on the Second *Campylobacter* report published in 2005 and an assessment of progress made (by the FSA) in addressing the Committee's recommendations in the 2005 *Campylobacter* report.

	Topic	Progress	Expected Output
		• Challenges to microbial risk assessment • Changing controls/risks	**Challenges to microbial risk assessment**: ACMSF's opinion on the challenges to microbial risk assessment including omics technologies. **Changing controls/risks**: ACMSF assessment on the changing controls/risks e.g. new food preparation practices, risky foods and use of QAC sanitizers.
2	**Newly Emerging Pathogens** The Newly Emerging Pathogens Working Group provides advice on the significance and risks from newly emerging or re-emerging pathogens through food chain exposure pathways.	Continuous.	The Committee to draw the FSA's attention to any risks to human health from newly emerging pathogens via food.
3	**Microbiological Surveillance of food** The Surveillance Working Group provides advice as required in connection with the FSA's microbiological food surveillance	Working group activities are continuous. Committee to consider the findings of the FSA's (Year 3) microbiological survey of *Campylobacter* contamination in fresh whole UK produced chilled chickens at retail sale	Surveillance Working Group/Committee comments on survey protocols and survey results for consideration by FSA in their microbiological food surveillance activities.

	Topic	Progress	Expected Output
	programme and any other surveillance relevant to foodborne disease.	when results are available.	
4	**Developing trends in relation to foodborne disease** The Committee receives updates on research, surveys, investigations, meetings and conferences of interest.	As issues arise EFIG[2] update will be provided at the June 2017 and January 2018 meetings.	ACMSF provides comments on the updates it receives for the FSA's consideration.
5	**International and EU developments on the microbiological safety of food** The Committee is updated on issues of relevance and significant developments at an EU and international level on microbiological food safety, such as EFSA opinions and Codex Committee on Food Hygiene meetings.	As issues arise.	ACMSF to note updates and provide comments if desired.
6	**Microbiological Incidents and outbreaks** The views of the Committee will be	As issues arise.	ACMSF assessment of the risks in relation to significant microbiological outbreaks/incidents.

[2] Epidemiology of Foodborne Infections Group

	Topic	Progress	Expected Output
	sought where necessary and updates provided on outbreaks of significance.		
7	**Antimicrobial resistance** ACMSF published a report on microbial antibiotic resistance in relation to food safety in 1999. Progress on the Committee's recommendations was reviewed in 2005 and 2007.	The Committee were updated on developments and emerging issues in relation to antimicrobial resistance in January 2013 and agreed to set up a Working Group to consider antimicrobial resistance and food chain issues in more detail. The subgroup has four meetings planned for 2017. Summaries of discussions and recommendations are provided at plenary meetings.	ACMSF assessment of the key risks to the food chain which may have consequences for human health and identification of key research or surveillance gaps in relation to the food chain.
8	***Mycobacterium bovis* and possible health risks associated with meat**	At the January 2017 meeting the Committee will be asked to review the risk level classification associated with the consumption of meat from animals with evidence of *M. bovis* infection. Committee to use the *M.bovis* and raw milk risk assessment framework. Uncertainties are to be highlighted before risk classification is considered.	ACMSF assessment of risk to human health in relation to the consumption of meat from animals with evidence of *M.bovis* infection.
9	**Social science research relating to microbiological food safety risks**	The Committee will receive updates on the findings of social science research which may have a bearing on the assessment of microbiological food safety risks.	ACMSF to note updates and provide comments if desired.

	Topic	Progress	Expected Output
10	**FSA Board's New Approach in relation to Rare Burgers**	The Committee will be updated on work the FSA is undertaking following the FSA Board's decision on rare burgers.	Committee to be kept informed of progress and to contribute to the work where appropriate.
11	**Changes to plant protection product MRLs: potential impact on food safety**	Members were alerted to this issue of changes to maximum residue levels (MRLs) for two quaternary ammonium compounds (QACs), chlorate and biocidal actives which are used as disinfectants/sanitisers in the food industry at the October 2015 and January 2016 meetings. The Committee agreed to the FSA's suggestion to setup a cross SAC working group to facilitate a full discussion to take place. Establishment of a group is on hold. The FSA will update members on ongoing activities on this subject at the January 2017 meeting.	ACMSF to consider the evidence in this area with respect to impacts on food safety and to provide advice to the FSA.
12	**Zika virus: risk assessment on the risk to consumers from Zika virus via food imported from Zika-endemic countries**	ACMSF considered draft risk assessment in June 2016. Subgroup on Newly-Emerging Pathogens have considered and finalised a revised risk assessment which has been circulated to the full Committee for information.	The Agency is looking for endorsement of this assessment and the overall risk via the food chain from the Committee.
13	**A systematic review of Antimicrobial Resistance bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level**	Study funded by the FSA and carried out by the Royal Veterinary College was published November 2016. RVC to present findings to ACMSF at the January 2017 meeting.	ACMSF to comment on systematic review findings.

	Topic	Progress	Expected Output
14	**Risk assessment outputs**	Committee to revisit its approach to how it expresses risk assessment outputs.	Improved consistency and clarity in framing risk assessment outputs.

Annex III

Terms of Reference and Membership of the Advisory Committee on the Microbiological Safety of Food, its Working Groups and its *Ad Hoc* Groups

Terms of reference

ACMSF

To assess the risk to humans from microorganisms which are used or occur in or on food and to advise the Food Standards Agency on any matters relating to the microbiological safety of food.

Surveillance Working Group

To facilitate the provision of ACMSF advice to government in connection with its microbiological food surveillance programme and other surveillance relevant to foodborne disease, particularly in relation to the design, methodology, sampling and statistical aspects; and to report back regularly to the ACMSF.

Newly Emerging Pathogens Working Group

To assemble information on the current situation on this topic in order to decide whether there is a potential problem in relation to the microbiological safety of food; and to recommend to the ACMSF whether the Committee needs to undertake further action.

Antimicrobial Resistance Working Group

- To brief ACMSF on developments in relation to antimicrobial resistance and the food chain and identify evidence that will assist the group in assessing the risks.

- To review key documents and identify the risks for the UK food chain and relevant aspects of the feed chain in relation to antimicrobial resistance which may have consequences for human health.

- To comment on progress in understanding the issue of antimicrobial-resistant microorganisms and the food chain since the ACMSF produced its report in 1999 and subsequent reviews in 2005 and 2007, including the relevance of any outstanding recommendations.

- To highlight key research or surveillance gaps in relation to antimicrobial-resistant microorganisms and the food/feed chain and identify those which are considered a priority.

Fixed-term task and finish group on antimicrobial resistance

To identify research questions and potential approaches which would (i) decrease uncertainty about any linkage between use of antimicrobials in food production, the incidence of antimicrobial resistance in pathogens and commensals in food production, and the growing AMR-related public health burden, and (ii) allow us to model the impacts of changes in use of antimicrobials in food production. Poultry, sheep, cattle and pigs will be covered in the scope.

Ad Hoc Group on *Campylobacter*

To assess the actions that have taken place since the publication of the Second *Campylobacter* Report and make proposals to advise the FSA in evolving its strategy for reducing the incidence and risk of foodborne *Campylobacter* infection in humans.

Membership Tables

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Chair							
Professor S J O'Brien[3]	Professor of Infection Epidemiology and Zoonoses, University of Liverpool, Institute of Infection and Global Health, National centre for Zoonosis Research	✓	✓	✓			✓
Professor D McDowell[4,5]	Professor of Food Studies University of Ulster	✓	✓	✓	✓	✓	✓
Members							
Dr G Adak	Head of Gastrointestinal Infection Surveillance, Department of Gastrointestinal, Emerging & Zoonotic Infections, Health Protection Services Colindale	✓	✓				

[3] Appointment ended 31 March 2017, but continued to Chair *Ad Hoc* Group on Campylobacter
[4] Acting Chair from 1 April 2017
[5] Chair of AMR Task & Finish Group

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Dr G Barker	Senior Research Scientist, Institute of Food Research, Norwich	✓		✓			
Dr R Betts	Head of Food Microbiology, Campden BRI	✓	✓				
Professor J Coia[6,7]	Consultant Microbiologist, NHS Greater Glasgow and Clyde	✓	✓		✓	✓	
Mrs J Dobbs[8]	Member of the Social Science Research Committee	✓					✓
Dr G Godbole[9]	Consultant Medical Microbiologist and Parasitologist, Public Health England	✓		✓			
Mrs E Hill[10]	Head of Food, Health, Safety and Environment, CH&Co Group Ltd	✓					

[6] Chair of Surveillance Working Group
[7] Appointment ended 31 March 2017, but continued on AMR Task & Finish Group as a co-opted member
[8] *Ex officio* appointment (Member of Social Science Research Committee)
[9] Appointed 1 August 2017
[10] Appointed 1 January 2017

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Professor M Iturriza-Gómara	Professor of Virology, University of Liverpool	✓		✓			
Mr A Kyriakides	Head of Product Quality, Safety and Supplier Performance, Sainsburys	✓		✓			✓
Ms H Lawson[11]	Senior Environmental Health Officer, Royal Borough of Greenwich	✓	✓				
Dr G Lowe[12]	Consultant in Communicable Disease Control, Public Health Wales	✓		✓			
Dr R Manuel[13]	Consultant Clinical Microbiologist, Public Health Laboratory, London	✓			✓		
Professor P McClure	Microbiologist and Microbiology Department Manager, Mondelēz International R&D Ltd	✓	✓				✓
Mr D Nuttall	Catering Manager Harper Adams University College	✓					✓

[11] Appointed 1 January 2017
[12] Appointed 1 January 2017
[13] Appointed 1 January 2017

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Dr D Tucker	Senior Lecturer in Veterinary Public Health/pig medicine, University of Cambridge	✓		✓	✓	✓	✓
Mrs A Williams[14]	Consumer representative	✓					✓
Co-opted Members							
Professor R E Holliman[15]	St George's, Barts & the Royal London Hospitals					✓	
Prof S Forsythe	Member of Advisory Committee on Animal Feedingstuffs (ACAF)				✓	✓	
Mr C Teale	Animal Health and Veterinary Laboratories Agency				✓	✓	
Prof J Threlfall	Formerly Health Protection Agency				✓	✓	
Prof D Stekel	School of Biosciences, University of Nottingham					✓	
Prof R La Ragione	School of Veterinary Medicine, University of Surrey					✓	

[14] Appointed 1 August 2017
[15] ACMSF membership ended 2016, but continued on the AMR Task & Finish Group as a co-opted member

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Dr A Charlett	Public Health England					✓	
Prof J Rushton	Institute of Infection and Global Health, University of Liverpool					✓	
Prof T Humphrey	Professor of Bacteriology and Food Safety, University of Swansea						✓
Prof N Strachan	University of Aberdeen						✓
Prof N McCarthy	University of Warwick						✓
Prof M C J Maiden	University of Oxford						✓

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Departmental Representatives							
Mr S Wyllie	Department for Environment, Food and Rural Affairs	✓		✓	✓	✓	
Dr C Schulte	Department of Health					✓	
Dr A Hart	Environment Agency					✓	
Dr K Healey	Veterinary Medicines Directorate					✓	
Mr A Hardgrave	Food Standards Agency						✓
Scientific Secretaries							
Dr P Cook	Food Standards Agency	✓			✓	✓	
Dr M Upadhyay	Food Standards Agency	✓	✓	✓		✓	✓
Ms K Thomas	Food Standards Agency				✓		
Administrative Secretariat							
Mr A Adeoye	Food Standards Agency	✓	✓	✓	✓	✓	✓
Ms S Butler	Food Standards Agency	✓	✓	✓	✓	✓	✓

Annex IV

Advisory Committee on the Microbiological Safety of Food Register of Members' Interests

Member	*Personal interests*		*Non-personal interests*	
	Name of company	**Nature of interest**	**Name of company**	**Nature of interest**
Professor S J O'Brien	None		Various	Research funding in collaboration with industrial partners FSA funded research
Professor D McDowell	University of Ulster	Emeritus Professor	Various	Research funding in collaboration with industrial partners
Dr G Adak	None		None	
Dr G Barker	None		Various	Research funding in collaboration with industrial partners
Dr R Betts	Campden Group Services	Employee	A range of food producers/providers and associated service industries	Work for Campden BRI's members
Professor J Coia	Tesco UK	Ad Hoc medico-legal work on infection related matters Consultancy work	Various	Funding for research projects
Mrs J Dobbs	None		None	
Dr G Godbole	None		None	
Mrs E Hill	CH&Co Group	Employee	UK Hospitality	Working partnership

Member	*Personal interests*		*Non-personal interests*	
	Name of company	**Nature of interest**	**Name of company**	**Nature of interest**
Professor M Iturriza-Gómara	None		Various	Research grants from pharmaceutical industry (vaccine related work)
Mr A Kyriakides	Sainsbury's Supermarkets Ltd	Employee	Campden BRI	Chairman
Ms H Lawson	Royal Borough of Greenwich Chartered Institute of Environment Health	Employee Member		
Dr G Lowe	Public Health Wales Chicken House Books	Employee Publishing contract		
Dr R Manuel	Public Health England	Employee	Various	Research funding from public and private sector
Professor P McClure	Mondelez UK R & D Ltd Unilever plc Woodhead Publishing and Elsevier	Employee (Europe Manager) Shareholder Royalties on book chapters		

Member	***Personal interests***		***Non-personal interests***	
	Name of company	**Nature of interest**	**Name of company**	**Nature of interest**
Mr D Nuttall	Harper Adams University College	Employee	None	
Dr D Tucker	University of Cambridge Pembroke College, Cambridge Genus plc BP Amoco and Genus plc and membership of Royal College of Surgeons and European College of Pig Health Management	Employee Fellowship and trustee Consultancy Shareholder Member	Zoetis Animal Health and Ceva Animal Health	Research funding to support pig clinical residency training programs

Member	*Personal interests*		*Non-personal interests*	
	Name of company	**Nature of interest**	**Name of company**	**Nature of interest**
Antimicrobial Resistance Working Group				
Professor R E Holliman	Public Health England St George's, University of London	Employee Employee	None	
Professor S Forsythe	None		None	
Mr C Teale	None		None	
Prof J Threlfall	None		None	
AMR Task & Finish Group				
Prof R Holliman	None		None	
Prof D Stekel	None		None	
Prof R La Ragione	None		None	
Dr A Charlett	None		None	
Prof J Rushton	None		None	

***Ad Hoc* Group on Campylobacter**				
Prof T Humphrey	British Egg Industry Council McDonalds	Consultant Consultant	FSA part-funded project	Involvement with ENIGMA research project
Prof N Strachan	None	None	FSA part-funded project	Involvement with ENIGMA research project
Prof N McCarthy	None	None	FSA part-funded project	Involvement with ENIGMA research project
Prof M C J Maiden	None	None	None	None

Annex V

CODE OF PRACTICE FOR MEMBERS OF THE ADVISORY COMMITTEE ON THE MICROBIOLOGICAL SAFETY OF FOOD

Public service values

The members of the Advisory Committee on the Microbiological Safety of Food must at all times

- observe the highest standards of **impartiality, integrity and objectivity** in relation to the advice they provide and the management of this Committee;

- be accountable, through the Food Standards Agency (the Agency) and, ultimately, Ministers, to Parliament and the public for the Committee's activities and for the standard of advice it provides.

The Ministers of the sponsoring department (the Agency) are answerable to Parliament for the policies and performance of this Committee, including the policy framework within which it operates.

Standards in public life

All Committee members must:

- follow the Seven Principles of Public Life set out by the Committee on Standards in Public Life (Appendix 1);

- comply with this Code, and ensure they understand their duties, rights and responsibilities, and that they are familiar with the functions and role of this Committee and any relevant statements of Government policy. If necessary, members should consider undertaking relevant training to assist them in carrying out their role;

- not misuse information gained in the course of their public service for personal gain or for political purpose, nor seek to use the opportunity of public service to promote their private interests or those of connected persons, firms, businesses or other organizations; and

- not hold any paid or high-profile unpaid posts in a political party, and not engage in specific political activities on matters directly affecting the work of this Committee. When engaging in other political activities, Committee members should be conscious of their public role and exercise proper discretion. These restrictions do not apply to MPs (in those cases where MPs are eligible to be appointed), to local councillors, or to Peers in relation to their conduct in the House of Lords.

Role of Committee members

Members have collective responsibility for the operation of this Committee. They must:

- engage fully in collective consideration of the issues, taking account of the full range of relevant factors, including any guidance issued by the Agency;

- ensure that they adhere to the Agency's Code of Practice on Openness (including prompt responses to public requests for information); agree an Annual Report; and, where practicable and appropriate, provide suitable opportunities to open up the work of the Committee to public scrutiny;

- follow Agency guidelines on divulging any information provided to the Committee in confidence;

- ensure that an appropriate response is provided to complaints and other correspondence, if necessary with reference to the Agency; and

- ensure that the Committee does not exceed its powers or functions.

Individual members should inform the Chair (or the Secretariat on his behalf) if they are invited to speak in public in their capacity as a Committee member.

Communications between the Committee and the Agency will generally be through the Chair except where the Committee has agreed that an individual member should act on its behalf. Nevertheless, any member has the right of access to the Chair of the Agency on any matter which he or she believes raises important issues relating to his or her duties as a Committee member. In such cases, the agreement of the rest of the Committee should normally be sought.

Individual members can be removed from office by the Chair of the Agency if, in the view of the Chair of the Agency, they fail to carry out the duties of office or are otherwise unable or unfit to carry out those duties.

The role of the Chair

The Chair has particular responsibility for providing effective leadership on the issues above. In addition, the Chair is responsible for:

- ensuring that the Committee meets at appropriate intervals, and that the minutes of meetings and any reports to the Agency accurately record the decisions taken and, where appropriate, the views of individual members;

- representing the views of the Committee to the general public, notifying and, where appropriate, consulting the Agency, in advance where possible; and

- ensuring that new members are briefed on appointment (and their training needs considered), and providing an assessment of their performance, on request, when members are considered for re-appointment to the Committee or for appointment to the board of some other public body.

DEPARTMENTAL ASSESSORS AND THE SECRETARIAT

Departmental assessors

Meetings of the ACMSF and its Groups are attended by Departmental Assessors. The Assessors are currently nominated by, and are drawn from, those with relevant policy interests and responsibilities in the Food Standards Agency (including FSA Northern Ireland and Wales), and the Department for Environment, Food and Rural Affairs. Assessors are not members of the ACMSF and do not participate in Committee business in the manner of members. The role of the Assessors includes sharing with the secretariat the responsibility of ensuring that information is not unnecessarily withheld from the Committee. Assessors should make the Committee aware of the existence of any information that has been withheld from the Committee on the basis that it is exempt from disclosure under Freedom of Information legislation unless that legislation provides a basis for not doing so. Assessors keep their parent Departments informed about the Committee's work and act as a conduit for the exchange of information; advising the Committee on relevant policy developments and the implications of ACMSF proposals; informing ACMSF work through the provision of information; and being informed by the Committee on matters of mutual interest. Assessors are charged with ensuring that their parent Departments is promptly informed of any matters which may require a response from Government.

The Secretariat

The primary function of the Secretariat is to facilitate the business of the Committee. This includes supporting the Committee by arranging its meetings, assembling and analysing information, and recording conclusions. An important task is ensuring that proceedings of the Committee are properly documented and recorded. The Secretariat is also a source of advice and guidance to members on procedures and processes.

The ACMSF Secretariat is drawn from staff of the Food Standards Agency. However, it is the responsibility of the Secretariat to be an impartial and disinterested reporter and at all times to respect the Committee's independent role. The Secretariat is required to guard against introducing

bias during the preparation of papers, during meetings, or in the reporting of the Committee's deliberations.

Handling conflicts of interest

The purpose of these provisions is to avoid any danger of Committee members being influenced, or appearing to be influenced, by their private interests in the exercise of their public duties. All members should declare any personal or business interest which may, or may be *perceived* (by a reasonable member of the public) to, influence their judgement. A guide to the types of interest which should be declared is at Appendix 2.

(i) Declaration of Interests to the Secretariat

Members of the Committee should inform the Secretariat in writing of their current **personal** and **non-personal** interests (or those of close family members* and of people living in the same household), when they are appointed, including the principal position(s) held. Only the name of the company and the nature of the interest are required; the amount of any salary etc need not be disclosed. Members are asked to inform the Secretariat at any time of any change of their **personal** interests and will be invited to complete a declaration form once a year. It is sufficient if changes in **non-personal** interests are reported in the annual declaration form following the change. (Non-personal interests involving less than £1,000 from a particular company in the previous year need not be declared to the Secretariat).

The register of interests should be kept up-to-date and be open to the public.

(ii) Declaration of Interests and Participation at Meetings

Members of the Committee are required to declare any direct commercial interests, or those of close family members,* and of people living in the same household, in matters under discussion at each meeting. Members should not participate in the discussion or determination of matters in which they have an interest, and should normally withdraw from the meeting (even if held in public) if:-

- their interest is direct and pecuniary; or

- their interest is covered in specific guidance issued by the ACMSF or the Agency which requires them not to participate in, and/or to withdraw from, the meeting.

* Close family members include personal partners, parents, children, brothers, sisters and the personal partners of any of these.

Personal liability of Committee members

A Committee member may be personally liable if he or she makes a fraudulent or negligent statement which results in a loss to a third party; or may commit a breach of confidence under common law or a criminal offence under insider dealing legislation, if he or she misuses information gained through their position. However, the Government has indicated that individual members who have acted honestly, reasonably, in good faith and without negligence will not have to meet out of their own personal resources any personal civil liability which is incurred in execution or purported execution of their Committee functions.

Appendix 1

THE SEVEN PRINCIPLES OF PUBLIC LIFE

Selflessness

Holders of public office should take decisions solely in terms of the public interest. They should not do so in order to gain financial or other material benefits for themselves, their family, or their friends.

Integrity

Holders of public office should not place themselves under any financial or other obligation to outside individuals or organisations that might influence them in the performance of their official duties.

Objectivity

In carrying out public business, including making public appointments, awarding contracts, or recommending individuals for rewards and benefits, holders of public office should make choices on merit.

Accountability

Holders of public office are accountable for their decisions and actions to the public and must submit themselves to whatever scrutiny is appropriate to their office.

Openness

Holders of public office should be as open as possible about all the decisions and actions that they take. They should give reasons for their decisions and restrict information only when the wider public interest clearly demands.

Honesty

Holders of public office have a duty to declare any private interests relating to their public duties and to take steps to resolve any conflicts arising in a way that protects the public interests.

Leadership

Holders of public office should promote and support these principles by leadership and example.

Appendix 2

DIFFERENT TYPES OF INTEREST

The following is intended as a guide to the kinds of interest which should be declared. Where members are uncertain as to whether an interest should be declared, they should seek guidance from the Secretariat or, where it may concern a particular product which is to be considered at a meeting, from the Chair at that meeting. **If members have interests not specified in these notes, but which they believe could be regarded as influencing their advice, they should declare them.** However, neither the members nor the Secretariat are under any obligation to search out links of which they might *reasonably* not be aware - for example, either through not being aware of all the interests of family members, or of not being aware of links between one company and another.

Personal Interests

A personal interest involves the member personally. The main examples are:

- **Consultancies:** any consultancy, directorship, position in or work for the industry, which attracts regular or occasional payments in cash or kind;

- **Fee-Paid Work:** any work commissioned by industry for which the member is paid in cash or kind;

- **Shareholdings:** any shareholding or other beneficial interest in shares of industry. This does not include shareholdings through unit trusts or similar arrangements where the member has no influence on financial management;

- **Membership or Affiliation** to clubs or organisations with interests relevant to the work of the Committee.

Non-Personal Interests

A non-personal interest involves payment which benefits a department for which a member is responsible, but is not received by the member personally. The main examples are:

- **Fellowships:** the holding of a fellowship endowed by the industry;

- **Support by Industry:** any payment, other support or sponsorship by industry which does not convey any pecuniary or material benefit to a member personally, but which does benefit their position or department e.g.

(i) a grant from a company for the running of a unit or department for which a member is responsible;

(ii) a grant or fellowship or other payment to sponsor a post or a member of staff in the unit for which a member is responsible (this does not include financial assistance to students);

(iii) the commissioning of research or other work by, or advice from, staff who work in a unit for which a member is responsible.

Members are under no obligation to seek out knowledge of work done for, or on behalf of, industry by departments for which they are responsible if they would not normally expect to be informed. Where members are responsible for organisations which receive funds from a large number of companies involved in that industry, the Secretariat can agree with them a summary of non-personal interests rather than draw up a long list of companies.

- **Trusteeships:** any investment in industry held by a charity for which a member is a trustee.

Where a member is a trustee of a charity with investments in industry, the Secretariat can agree with the member a general declaration to cover this interest rather than draw up a detailed portfolio.

DEFINITIONS

For the purpose of the Advisory Committee on the Microbiological Safety of Food, 'industry' means:

- Companies, partnerships or individuals who are involved with the production, manufacture, packaging, sale, advertising, or supply of food or food processes, subject to the Food Safety Act 1990;

- Trade associations representing companies involved with such products;

- Companies, partnerships or individuals who are directly concerned with research, development or marketing of a food product which is being considered by the Committee

In this Code, 'the Secretariat' means the Secretariat of the Advisory Committee on the Microbiological Safety of Food.

Annex VI

GOOD PRACTICE GUIDELINES FOR THE INDEPENDENT SCIENTIFIC ADVISORY COMMITTTEES

PREAMBLE

Guidelines 2000: Scientific Advice and Policy Making[16] set out the basic principles which government departments should follow in assembling and using scientific advice, thus:

- think ahead, identifying the issues where scientific advice is needed at an early stage;
- get a wide range of advice from the best sources, particularly where there is scientific uncertainty; and
- publish the scientific advice they receive and all the relevant papers.

The *Code of Practice for Scientific Advisory Committees*[17] (revised in December 2007) provided more detailed guidance specifically focused on the operation of scientific advisory committees (SACs). The Agency subsequently commissioned a *Report on the Review of Scientific Committees*[18] to ensure that the operation of its various advisory committees was consistent with the remit and values of the Agency, as well as the Code of Practice.

The Food Standards Agency's Board has adopted a **Science Checklist** (Board paper: FSA 06/02/07) to make explicit the points to be considered in the preparation of papers dealing with science-based issues which are either assembled by the Executive or which draw on advice from the Scientific Advisory Committees.

The Board welcomed a proposal from the Chairs of the independent SACs to draw up Good Practice Guidelines based on, and complementing, the Science Checklist.

[16] Guidelines on Scientific Analysis in Policy Making, OST, October 2005. Guidelines 2000: Scientific advice and policy-making. OST July 2000
[17] Code of Practice for Scientific Advisory Committees, OST December 2001
[18] Report on the Review of Scientific Committees, FSA, March 2002

THE GOOD PRACTICE GUIDELINES

These Guidelines have been developed by 9 advisory committees:

Advisory Committee on Animal Feedingstuffs[19]
Advisory Committee on Microbiological Safety of Foods
Advisory Committee on Novel Foods and Processes
Advisory Committee on Research
Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment[20]
Committee on Mutagenicity of Chemicals in Food, Consumer Products and the Environment[21]
Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment[22]
Scientific Advisory Committee on Nutrition[23]
Spongiform Encephalopathy Advisory Committee[24]

These committees share important characteristics. They:

- are independent;
- work in an open and transparent way; and
- are concerned with risk assessment not risk management.

The Guidelines relate primarily to the risk assessment process since this is the committees' purpose. However, the Agency may wish on occasion to ask the independent scientific advisory committees whether a particular risk management option is consistent with their risk assessment.

Twenty-seven principles of good practice have been developed. However, the different committees have different duties and discharge those duties in

[19] FSA Secretariat
[20] Joint FSA/HPA Secretariat, HPA lead
[21] Joint FSA/HPA Secretariat, HPA lead
[22] Joint FSA/HPA, FSA lead
[23] Joint FSA/DH Secretariat
[24] Joint Defra/FSA/DH Secretariat

different ways. Therefore, not all of the principles set out below will be applicable to all of the committees, all of the time.

This list of principles will be reconsidered by each committee annually as part of the preparation of its Annual report, and will be attached as an Annex to it.

Principles

Defining the issue

1. The FSA will ensure that the issue to be addressed is clearly defined and takes account of stakeholder expectations. The committee Chair will refer back to the Agency if discussion suggests that a re-definition is necessary.

Seeking input

2. The Secretariat will ensure that stakeholders are consulted at appropriate points in the committee's considerations and, wherever possible, SAC discussions should be held in public.

3. The scope of literature searches made on behalf of the committee will be clearly set out.

4. Steps will be taken to ensure that all available and relevant scientific evidence is rigorously considered by the committee, including consulting external/additional scientific experts who may know of relevant unpublished or pre-publication data.

5. Data from stakeholders will be considered and weighted according to quality by the committee.

6. Consideration by the secretariat and the Chair will be given to whether expertise in other disciplines will be needed.

7. Consideration will be given by the Secretariat or by the committee to whether other scientific advisory committees need to be consulted.

Validation

8. Study design, methods of measurement and the way that analysis of data has been carried out will be assessed by the committee.

9. If qualitative data have been used, they will be assessed by the committee in accordance with the principles of good practice, e.g. set out in guidance from the Government's Chief Social Researcher[25].

10. Formal statistical analyses will be included wherever possible. To support this, each committee will have access to advice on quantitative analysis and modelling as needed.

11. When considering what evidence needs to be collected for assessment, the following points will be considered:
    - the potential for the need for different data for different parts of the UK or the relevance to the UK situation for any data originating outside the UK; and
    - whether stakeholders can provide unpublished data.

12. The list of references will make it clear which references have either not been subject to peer review or where evaluation by the committee itself has conducted the peer review.

Uncertainty

13. When reporting outcomes, committees will make explicit the level and type of uncertainty (both limitations on the quality of the available data and lack of knowledge) associated with their advice.

14. Any assumptions made by the committee will be clearly spelled out, and, in reviews, previous assumptions will be challenged.

[25] There is of guidance issued under the auspices of the Government's Social Research Unit and the Chief Social Researcher's Office (Quality in Qualitative Evaluation: A Framework for assessing research evidence. August 2003. www.strategy.gov.uk/downloads/su/qual/downloads/qqe-rep.pdf and The Magenta Book. www.gsr.gov.uk/professional_guidance/magenta_book/guidance.asp).

15. Data gaps will be identified and their impact on uncertainty assessed by the committee.

16. An indication will be given by the committee about whether the database is changing or static.

Drawing conclusions

17. The committee will be broad-minded, acknowledging where conflicting views exist and considering whether alternative hypotheses fit the same evidence.

18. Where both risks and benefits have been considered, the committee will address each with the same rigour.

19. Committee decisions will include an explanation of where differences of opinion have arisen during discussions, specifically where there are unresolved issues and why conclusions have been reached.

20. The committee's interpretation of results, recommended actions or advice will be consistent with the quantitative and/or qualitative evidence and the degree of uncertainty associated with it.

21. Committees will make recommendations about general issues that may have relevance for other committees.

Communicating committees' conclusions

22. Conclusions will be expressed by the committee in clear, simple terms and use the minimum caveats consistent with accuracy.

23. It will be made clear by the committee where assessments have been based on the work of other bodies and where the committee has started afresh, and there will be a clear statement of how the current conclusions compare with previous assessments.

24. The conclusions will be supported by a statement about their robustness and the extent to which judgement has had to be used.

25. As standard practice, the committee secretariat will publish a full set of references (including the data used as the basis for risk assessment and other committee opinions) at as early a stage as possible to support openness and transparency of decision-making. Where this is not possible, reasons will be clearly set out, explained and a commitment made to future publication wherever possible.

26. The amount of material withheld by the committee or FSA as being confidential will be kept to a minimum. Where it is not possible to release material, the reasons will be clearly set out, explained and a commitment made to future publication wherever possible.

27. Where proposals or papers being considered by the Board rest on scientific evidence, the Chair of the relevant scientific advisory committee (or a nominated expert member) will be invited to the table at Open Board meetings to provide this assurance and to answer Members' questions on the science. To maintain appropriate separation of risk assessment and risk management processes, the role of the Chairs will be limited to providing an independent view on how their committee's advice has been reflected in the relevant policy proposals. The Chairs may also, where appropriate, be invited to provide factual briefing to Board members about particular issues within their committees' remits, in advance of discussion at open Board meetings.

Glossary of Terms

Campylobacter: Commonest reported bacterial cause of infectious intestinal disease in England and Wales. Two species account for the majority of infections: *C. jejuni* and *C. coli*. Illness is characterized by severe diarrhoea and abdominal pain.

Clostridium perfringens:

Listeriosis: A rare but potentially life-threatening disease caused by *Listeria monocytogenes* infection. Healthy adults are likely to experience only mild infection, causing flu-like symptoms or gastroenteritis. However, *L. monocytogenes* infection can occasionally lead to severe blood poisoning (septicaemia) or meningitis.

Listeria monocytogenes: Gram-positive pathogenic bacteria that can cause listeriosis in humans.

Listeria spp: Ubiquitous bacteria widely distributed in the environment. Among the seven species of *Listeria*, only *Listeria monocytogenes* is commonly pathogenic for humans. It can cause serious infections such as meningitis or septicaemia in newborns, immunocompromised patients, and the elderly or lead to abortion.
Pathogen: An infectious microorganism, bacteria, virus or other agent that can cause disease by infection.

Salmonella: A genus of Gram-negative bacteria which can cause salmonellosis in humans. Specific types of *Salmonella* are normally given a name, for example *Salmonella* Typhimurium has full name *Salmonella enterica* serovar Typhimurium.

Strain: Population within a species or sub-species distinguished by sub-typing.

Toxin: A poison, often a protein produced by some plants, certain animals fungi and pathogenic bacteria, which can be highly toxic for other living organisms.

Typing: Method used to distinguish between closely related micro-organisms.

VTEC: Vero cytotoxin-producing *Escherichia coli* that characteristically produce powerful toxins that kill a variety of cell types, including Vero cells on which their effects were first demonstrated.

Glossary of Abbreviations

ACMSF: Advisory Committee on the Microbiological Safety of Food

APHA: Animal and Plant Health Agency

AMR: Antimicrobial Resistance

COC: Committee on Carcinogenicity

COM: Committee on Mutagenicity

Defra: Department for Environment Food and Rural Affairs

EFIG: Epidemiology of Foodborne Infections Group

EFSA: European Food Safety Authority

FOI: Freedom of Information

FSA: Food Standards Agency

LA-MRSA: Livestock-associated Meticillin Resistant *Staphylococcus aureus*

OCPA: Office of the Commissioner for Public Appointments

SSRC: Social Science Research Committee

STEC: Shiga toxin-producing *Escherichia coli*

VTEC O157: Vero cytotoxin-producing *Escherischia coli* O157

WGS: Whole genome sequencing

References

1. Advisory Committee on the Microbiological Safety of Food (1993). Report of Progress 1990-92. HMSO, London. ISBN 0-11-321664-5.

2. Advisory Committee on the Microbiological Safety of Food (1994). Annual Report 1993. HMSO, London. ISBN 0-11-321816-8.

3. Advisory Committee on the Microbiological Safety of Food (1995). Annual Report 1994. HMSO, London. ISBN 0-11-321921-0.

4. Advisory Committee on the Microbiological Safety of Food. Annual Report 1995. Department of Health, Wetherby. ISBN 1 85839 5763.

5. Advisory Committee on the Microbiological Safety of Food (1997). Annual Report 1996. Department of Health. ISBN 85839 7243.

6. Advisory Committee on the Microbiological Safety of Food (1998). Annual Report 1997. Department of Health.

7. Advisory Committee on the Microbiological Safety of Food (1999). Annual Report 1998. Department of Health.

8. Advisory Committee on the Microbiological Safety of Food (2000). Annual Report 1999. Department of Health.

9. Advisory Committee on the Microbiological Safety of Food (2001). Annual Report 2000. Food Standards Agency. FSA/0012/0401.

10. Advisory Committee on the Microbiological Safety of Food (2002). Annual Report 2001. Food Standards Agency. FSA/0577/0502.

11. Advisory Committee on the Microbiological Safety of Food (2003). Annual Report 2002. Food Standards Agency. FSA/0817/0303.

12. Advisory Committee on the Microbiological Safety of Food (2004). Annual Report 2003. Food Standards Agency. FSA/0888/0204.

13. Advisory Committee on the Microbiological Safety of Food (2005). Annual Report 2004. Food Standards Agency. FSA/0990/0805.

14. Advisory Committee on the Microbiological Safety of Food (2006). Annual Report 2005. Food Standards Agency. FSA/1099/1006

15. Advisory Committee on the Microbiological Safety of Food (2007). Annual Report 2006. Food Standards Agency. FSA/11191/0807

16. Advisory Committee on the Microbiological Safety of Food (2008). Annual Report 2007. Food Standards Agency. FSA/1281/0908.

17. Advisory Committee on the Microbiological Safety of Food (2009). Annual Report 2008. Food Standards Agency. FSA/1409/0609.

18. Advisory Committee on the Microbiological Safety of Food (2010). Annual Report 2009. Food Standards Agency.

19. Advisory Committee on the Microbiological Safety of Food (2011). Annual Report 2010. Food Standards Agency.

20. Advisory Committee on the Microbiological Safety of Food (2012). Annual Report 2011. Food Standards Agency

21. Advisory Committee on the Microbiology Safety of Food (2013). Annual Report 2012. Food Standards Agency

22. Advisory Committee on the Microbiology Safety of Food (2014). Annual Report 2013. Food Standards Agency

23. Advisory Committee on the Microbiology Safety of Food (2014). Annual Report 2014. Food Standards Agency

24. Advisory Committee on the Microbiology Safety of Food (2014). Annual Report 2015. Food Standards Agency

25. Advisory Committee on the Microbiology Safety of Food (2014). Annual Report 2016. Food Standards Agency

26. Advisory Committee on the Microbiological Safety of Food (1992). Report on Vacuum Packaging and Associated Processes. HMSO, London. ISBN 0-11-321558-4.

27. Advisory Committee on the Microbiological Safety of Food (1993). Report on *Salmonella* in Eggs. HMSO, London. ISBN 0-11-321568-1.

28. Advisory Committee on the Microbiological Safety of Food (1993). Interim Report on *Campylobacter*. HMSO, London. ISBN 0-11-321662-9.

29. Advisory Committee on the Microbiological Safety of Food (1995). Report on Verocytotoxin-Producing *Escherichia coli*. HMSO, London. ISBN 0-11-321909-1.

30. Advisory Committee on the Microbiological Safety of Food (1996). Report on Poultry Meat. HMSO, London. ISBN 0-11-321969-5.

31. Advisory Committee on the Microbiological Safety of Food (1998). Report on Foodborne Viral Infections. The Stationery Office, London. ISBN 0-11-322254-8.

32. Advisory Committee on the Microbiological Safety of Food (1999). Report on Microbial Antibiotic Resistance in Relation to Food Safety. The Stationery Office, London. ISBN 0-11-322283-1.

33. Advisory Committee on the Microbiological Safety of Food (1999). Report on Microbial Antibiotic Resistance in Relation to Food Safety. Synopsis. The Stationery Office, London. ISBN 0-11-322295-5.

34. Advisory Committee on the Microbiological Safety of Food (2001). Second Report on *Salmonella* in Eggs. The Stationery Office, London. ISBN 0-11-322466-4.

35. Advisory Committee on the Microbiological Safety of Food. Report on *Mycobacterium bovis*. A review of the possible health risks to consumers of meat from cattle with evidence of *Mycobacterium bovis* infection. Food Standards Agency. January 2002. FSA/0400/2002.

36. Advisory Committee on the Microbiological Safety of Food. Second Report on *Campylobacter*. June 2005. Food Standards Agency. FSA/0964/0605.

37. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Infant Botulism. Report on Minimally Processed Infant Weaning Foods and the Risk of Infant Botulism. July 2006. Food Standards Agency. FSA/1092/0706

38. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Botulism in Cattle. Report on Botulism in Cattle. December 2006. Food Standards Agency. FSA/1112/1206.

39. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Safe Cooking of Burgers. June 2007. Food Standards Agency. FSA/1183/0607.

40. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Botulism in Cattle, Sheep and Goats. February 2009. Food Standards Agency. FSA/1312/0209.

41. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Vulnerable Groups Report on the Increased Incidence of Listeriosis in the UK. July 2009. Food Standards Agency. FSA/1439/0709.

42. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Vulnerable Groups. Risk profile in relation to toxoplasma in the food chain. September 2012. Food Standards Agency.

43. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Raw, Rare and Low Temperature Cooked Foods. April 2014. Food Standards Agency.

44. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Foodborne Viral Infections. An update on viruses in the food chain. March 2015. Food Standards Agency.

45. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Eggs. An update on the microbiological risk from shell eggs and their products. July 2016. Food Standards Agency.

46. Committee on Standards in Public Life (Nolan: First Report). May 1995.

47. The Commissioner for Public Appointments. Office of the Commissioner for Public Appointments. Code of Practice for Ministerial Appointments to Public Bodies August 2009.

48. Government Office for Science Code of Practice for Scientific Advisory Committees. December 2007.

49. Food Standards Agency. Appointments to the Advisory Committee on the Microbiological Safety of Food. Announced January 2017. https://www.food.gov.uk/news-updates/news/2017/15893/appointments-to-acmsf

50. Food Standards Agency. Report on the Review of Scientific Committees. 2002. FSA/0567/0402.

51. Advisory Committee on the Microbiological Safety of Food. ACM/1241. A systematic review of AMR bacteria in pork, poultry, dairy products, seafood and fresh produce at UK retail level.

52. Technical specifications for the analysis and reporting of data on antimicrobial resistance (AMR) in the European Union Summary Report, EFSA Journal 2012;10(2):2587 [53 pp.] at: https://www.efsa.europa.eu/en/efsajournal/pub/2587

53. Technical specifications for the analysis and reporting of data on antimicrobial resistance (AMR) in the European Union Summary Report, EFSA Journal 2012;10(2):2587 [53 pp.] at: https://www.efsa.europa.eu/en/efsajournal/pub/2587

54. https://acmsf.food.gov.uk/committee/acmsf/acmsfsubgroups/amrwg

55. Advisory Committee on the Microbiological Safety of Food. ACM/1243. Mycobacterium bovis and possible health risks associated with meat.

56. Advisory Committee on the Microbiological Safety of Food. ACM/1244. Changes to plant protection product and biocide MRLs: potential impact on food safety.

57. Advisory Committee on the Microbiological Safety of Food. ACM/1245 Epidemiology of Foodborne Infections Group.