

Advisory Committee on the Microbiological Safety of Food

Annual Report 2010

Advises the Food Standards Agency on the
Microbiological Safety of Food

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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 Reports¹⁻¹⁸ and in a series of subject-specific reports.¹⁹⁻³⁴

Foreword



1. I am pleased to present the 2010 Annual Report of the Advisory Committee on the Microbiological Safety of Food (ACMSF). Over the past year, the Committee has provided advice to the Food Standards Agency (FSA) on a range of issues relating to the microbiological safety of food.
2. In March 2010 we were updated on the increased incidence of listeriosis in England and Wales. We were advised that the incidence had approximately doubled since 2001, with much of this increase occurring in older patients who present with bacteraemia (invasion of the blood stream) in the absence of central nervous system (CNS) infection. This increase had continued into 2009. Findings from the Health Protection Agency's (HPA) work to redefine accurately the population at risk of listeriosis demonstrated that a wide range of medical conditions and a variety of foods were associated with an increased risk of listeriosis and that ethnicity and deprivation appear to be important drivers for the disease. We were asked to review the appropriateness and delivery of current food safety advice for vulnerable groups in light of the evidence presented. We agreed that there was insufficient evidence to recommend altering the advice provided by the FSA and that more data was needed to inform and assess the high risk associations before any specific advice could be developed. We added that there was merit in drawing the attention of Chief Medical Officers and health professionals to the issues raised in the HPA study.
3. We also considered a report from the Social Science Research Committee (SSRC) Working Group on *Listeria: L.monocytogenes and food storage and food handling practices of the over 60s at home*. The Committee was asked to comment on the recommendations provided by the SSRC for the FSA in planning and prioritisation of FSA social science research in relation to *Listeria*.
4. The FSA sought our views on the issue of incidents involving the production of biltong in the UK. The FSA felt more information was required on the associated microbiological hazards in order to provide manufacturers and local authorities with practical advice on safe manufacturing practices. Campden BRI was commissioned to perform a literature review of available data on biltong plus similar dried products and an overview of this information was provided to the Committee. The Committee agreed that more experimental evidence was required on the effect of processing techniques before risks could be assessed and at the present time there was insufficient evidence for the FSA to provide advice to food producers and local authorities on the production of biltong.

5. In 2010 the FSA asked the Committee to consider the risks to consumers of meat and milk from cattle with evidence of *Mycobacterium bovis* infection given the rise in the incidence of *M. bovis* in cattle in England and Wales since the issue was last considered by the ACMSF in 2001.
6. The ACMSF reviewed changes in the hygiene regulations and *M. bovis* disease incidence in cattle and humans which have taken place over the last 10 years. The Committee confirmed the result of its 2001 risk assessment on meat and concluded that the risk to consumers remained very low. The Committee also considered the risks to consumers associated with *M. bovis* and pasteurised milk and milk products and concluded the risk remained acceptably low in milk that is properly pasteurised. The Committee agreed to consider the risk from unpasteurised milk and milk products in 2011 when the results from the FSA's study on survival of *M. bovis* in unpasteurised milk cheeses are available.
7. The views of the Committee were sought in relation to the increase in *Campylobacter* outbreaks associated with chicken liver products and the potential reasons for this increase. In 2009 and 2010 there had been an apparent increase in *Campylobacter* outbreaks in England, Wales and Scotland associated with consumption of chicken liver pâté/parfait, with nine of the 15 outbreaks in the period 2005-2009 occurring in 2009. Undercooking of the pâté or parfait was identified as a key factor in causing a number of the outbreaks. Five outbreaks had been reported up to week 28 of 2010. The Committee's discussion raised several hypotheses for the increase in outbreaks including changes in culinary fashions, customer demands and advice not reaching the intended target. It was agreed that this issue could be amenable to a formal risk assessment.
8. Following comments the ACMSF provided during the public consultation on the FSA's Foodborne Disease Strategy (FDS) 2010-2015, the FSA briefed the Committee on the background to the development of the strategy, its context in relation to other FSA work and the identification of FDS priorities. We endorsed the strategy and its development and welcomed the inclusion of work to understand the foodborne component of norovirus.
9. The Committee was briefed on the FSA's Food Hygiene Delivery Programme. We noted that conflicting priorities for food businesses were an important consideration for delivery of food hygiene as were links with education and influencing behaviour.
10. In March 2010 Dr David Brown (ACMSF member) gave a presentation on the key developments in foodborne viruses over the last ten years stating that since the last ACMSF review in 1998, risk assessments had been carried out into Norovirus, Influenza A and Hepatitis E. The Committee agreed to establish a subgroup to review foodborne viral infections. It was acknowledged that for enteric viruses it was hard to distinguish between

foodborne infection and infection from other routes but the Committee considered it important that food remained the foremost issue for discussion by the subgroup as this was the remit of the ACMSF.

11. The Committee was requested to assess the risk assessments, presented and carried out under the Waste and Resources Action Programme (WRAP): Confidence in Compost Programme, in terms of microbiological food safety. The risk assessments considered the use of composting and biogas treatment to dispose of waste containing meat and the use of source-segregated composts in UK agriculture. A group of members agreed to consider the risk assessments in detail on behalf of the Committee, concluding that the approach used was robust and suggesting a number of improvements. The group's response was adopted by the Committee at its September meeting and was approved for submission to WRAP.
12. On food surveillance, we considered the outcome of the FSA's UK-wide survey of microbiological contamination of raw red meat on retail sale, published in September 2010. We also approved a commentary paper drafted by the Surveillance Working Group on issues that had arisen from recent FSA *Campylobacter* surveys in relation to *Campylobacter* isolation methods. The paper highlighted considerations around reliable *Campylobacter* isolation and was approved for forwarding to the FSA for consideration in future surveillance work.
13. Looking to the future, the Committee will continue to consider the risks posed by *Campylobacter*, *Escherichia coli*, *Listeria*, *Salmonella* and viruses in food. We will report on the risks posed by *toxoplasma* in the food chain and consider the health risks associated with unpasteurised milk consumption. We will also undertake horizon scanning to identify potential future microbiological risks. The ACMSF will undergo its quinquennial review by the FSA in 2011 and we will consider the recommendations of this review.
14. I am indebted to the members of the Committee and its Working and *Ad Hoc* Groups, without whom the ACMSF would not operate effectively, and to the many other individuals and organisations who have helped the Committee with its work. I am also extremely grateful for the support of the Secretariat, whose efforts in ensuring the efficient and effective conduct of Committee business is invaluable.



Professor Sarah O'Brien
Chair

Introduction

1. This is the nineteenth Annual Report of the Advisory Committee on the Microbiological Safety of Food and covers the calendar year 2010.

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 Principles³⁵, the guidance issued by the Office of the Commissioner for Public Appointments (OCPA)³⁶ and the Government Office for Science Code of Practice for Scientific Advisory Committees³⁷. 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 2010

6. Two Members were appointed to the ACMSF during 2010: Professor David McDowell and Mr David Nuttall. Professor McDowell provides the Committee with food microbiology research expertise. His period of appointment runs from 1 April 2010 to 31 March 2014. Mr Nuttall provides the Committee with commercial catering expertise. His period of appointment runs from 1 April 2010 to 31 March 2012.

Re-appointments in 2010

7. The periods of appointments of the ACMSF Chair: Professor Sarah O'Brien and 5 members: Mrs Vivianne Buller, Mr Paul McMullin, Professor Peter Williams, Professor John Coia and Professor Paul Hunter expired on 31 March 2010. Professor O'Brien, Mrs Buller, Mr McMullin, Professor Williams and Professor Coia were re-appointed for a further 3 years from 1 April 2010 until 31 March 2013. Professor Hunter was reappointed for one further year from 1 April 2010 to 31 March 2011 as he had already served for 9 years of the maximum 10 years permitted.

Secretariat changes in 2010

8. In September 2010 Dr Sophie Rollinson joined the secretariat team to replace Dr Darren Cutts.

Committee and Group meetings

9. The full Committee met 2 times in 2010 - on 25 March and 23 September. The two meetings were chaired by Professor Sarah O'Brien and were open to members of the public.
10. The *Ad Hoc* Group on Vulnerable Groups (Chair: Professor Tom Humphrey) met twice, in May and September 2010, to deliberate on the issue of *toxoplasma* in the food chain. They aim to complete their report for the full Committee to consider by summer 2011.
11. The *Ad Hoc* Group on Foodborne Viral Infections (Chair: Dr David Brown) had its first meeting in November 2010. The Group considered its terms of reference, scope of the discussions and work programme and agreed that its focus should cover the particular viruses that pose a risk to consumers via food, the transmission route and the significance of the transmission route.
12. The Working Group on Surveillance (Chair: Professor Tom Humphrey) met once in 2010 and carried out some of their work via correspondence. They considered the FSA's UK-wide survey on the microbiological contamination of fresh red meats on retail sale and a UK wide survey on ready-to-eat meats and pâté at retail. Both surveys were signed off by the group and the FSA published the former in September 2010. The group also put together a paper on isolating *Campylobacter* in food to provide recommendations to the FSA in future *Campylobacter* surveillance work.
13. The Working Group on Newly Emerging Pathogens (Chair: Professor Paul Hunter) met once, in December 2010, to consider foodborne health risks associated with bleeding calf syndrome also known as Bovine Neonatal Pancytopenia (BNP). BNP is a haemorrhagic disease, first reported in May 2009 which primarily affects very young calves, resulting in substantial internal and mucous membrane bleeding and associated with a very high mortality rate. The Group received a presentation from the

Veterinary Laboratories Agency on investigations into the syndrome and agreed to meet again once the results from an ongoing case-control study were published.

Current membership and Declarations of Interests

14. Full details of the membership of the Committee and its Working and *Ad Hoc* Groups are given in Annex I. A Register of Members' Interests is at Annex II. In addition to the interests notified to the Secretariat and recorded at Annex II, Members are required to declare any direct commercial interest in matters under discussion at each meeting, in accordance with the ACMSF's Code of Practice³⁷. Declarations made are recorded in the minutes of each meeting.

Personal liability

15. 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 1999⁸ 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 Report¹⁴).

Openness

Improving public access

16. The ACMSF is committed to opening 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 FSA website at:

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

17. The Committee also has an e-mail address:

acmsf@foodstandards.gsi.gov.uk

18. 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

19. Following the recommendations flowing from the FSA's Review of Scientific Committees³⁹, the ACMSF decided that from 2003 onwards all of its full Committee meetings should be held in public.
20. All of the 2010 Committee meetings were held in Aviation House, the FSA's London Headquarters.
21. All of these 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

22. The Secretariat provided Members with regular reports of the work of other Scientific Advisory Committees advising the FSA. Mrs Rosie Glazebrook ACMSF consumer representative is a member of the Advisory Committees on Carcinogenicity (COC) and Mutagenicity (COM). The ACMSF Chair (Professor Sarah O'Brien) is a member of the General Advisory Committee on Science (GACS) and the National Expert Panel on New and Emerging Infections (NEPNEI).

Chapter 2: The Committee's Work in 2010

Listeria

Listeria monocytogenes

Redefining the population at risk

23. In March, the Health Protection Agency (HPA) presented an update on the incidence of listeriosis in England and Wales⁴⁰. Non-pregnancy related incidence of listeriosis was shown to have increased since 2001 in those over 60 who present with bacteraemia in the absence of central nervous system (CNS) infection. The increase could not be explained by variables such as gender, regional differences, recognised outbreaks, emerging *L. monocytogenes* subtypes, underlying conditions or socioeconomics. There were no differences observed between bacteraemia and CNS cases of listeriosis in terms of gender, season or infection subtype. However, underlying conditions were shown to be a factor. Malignancy in digestive organs was linked with bacteraemia and alcohol-related conditions were more likely to be related to CNS cases. Risks of listeriosis in relation to co-morbidity were presented showing that higher risks were associated with neoplasms, in particular cancers of the eye, brain, CNS and lymphoid tissues. Endocrine, nutritional and metabolic diseases, circulatory system and musculoskeletal system diseases were also associated with high risks. Incidence of listeriosis was also found to be higher in those most deprived. Of these cases, most were associated with a particular national chain of convenience store and the use of local food retailers. With increasing deprivation it was shown that cases were more likely to be in non-white British groups who were more likely not to eat outside of the home.
24. Cases of *L. monocytogenes* in the over 60s were investigated showing that those infected were more likely to eat cold cooked beef, processed pork, cold cooked seafood and dairy products. They were less likely to consume other types of pork and seafood, sandwiches and fresh vegetables. For pregnancy associated disease, although there was no observable change over time in non-ethnic groups, since 2005 there had been an increase in listeriosis in those considered of ethnic minority origin on the basis of surname. These people were considered more likely to consume pâté, cabbage or dill and shop in local food retailers. The HPA concluded that current UK food safety advice was delivered passively and targeted preferentially to pregnant women. This research was said to show a clear need to actively target advice to a wider range of vulnerable groups.
25. In the ensuing discussion the Committee noted that:

- There was evidence that some of those people described as ethnic minorities had come to the UK to give birth but had been exposed to listeriosis outside of the UK and that this should be given consideration in the future. The HPA responded that most cases described in the review were found to be resident in the UK. However, as the incubation period was approximately 90 days it was difficult to identify the source of infection. In addition neither ethnic-minority groups nor non-ethnic minority groups were more likely to eat foods brought in from overseas which may be considered a risk.
- It was unclear whether the behaviours described in the non-pregnant cases were age specific and what the total number of associations considered was in addition to those presented. The HPA stated that, although desirable, the remit of the project did not allow for detailed analysis of age related associations other than those over and under 60 years of age. Regarding exposure associations, approximately 40 were considered which were consolidated from a larger data set which again was limited by the terms of the project. Clarification was also requested as to whether the risks associated with supermarket chains had been the same chains for all cases. In response it was noted that there was a strong association with one major supermarket chain with links to food purchasing habits and deprivation. However, it was important to note that data were not available to investigate the results further.
- Although risk management, rather than advising people generally, it was likely to be more beneficial to advise those with underlying conditions of the factors that would make them more susceptible to listeriosis although it was acknowledged that more research was needed to identify specific risks associated with certain conditions. In general there was a consensus that advice should be targeted. Finally it was asked whether there was a way of using the association data obtained in the study to determine causation. It was stated that this work went beyond the scope of this project. However, it was highlighted that suggestions on causation may be covered by the FSA's Social Science Research Committee Working Group's report on *Listeria*.

Report of the Social Science Research Committee Working Group

26. The ACMSF *Ad Hoc* Group on Vulnerable Groups report on the increased incidence of listeriosis in the UK was published in 2009. One of the report's recommendations was for the report to be sent to the FSA's expert Social Science Research Committee (SSRC) to consider the food behaviour, storage and handling practices of elderly people in the home. The SSRC Working Group on *Listeria* produced its report (*L. monocytogenes* and food storage and food handling practices of the over 60s at home) which was presented to the ACMSF in September 2009. As no specific recommendation was recorded in the minutes of the September 2009 ACMSF meeting, the SSRC secretariat, in March 2010,

presented a paper on the SSRC working group's assessment of *L. monocytogenes* and the food storage and food handling practices of the over 60s⁴¹. The SSRC recommended that a thorough literature review on new research should be commissioned to aid the group in further deliberations. In addition it was recommended that a social survey be performed to provide accurate baseline data on knowledge of food safety and food handling in the over 60's (option i), allowing follow up on specific groups of people (option ii). This would be a high priority should the FSA wish to consider the causes of future changes to listeriosis in the over 60s. Also recommended were a household based study of those over 60 who have had listeriosis to establish socio-demographic characteristics (option iii) and an exploration of dissemination of current advice (option iv), these would be a priority if considering current food related practices. Finally, there was a recommendation to develop a better understanding of the retail environment such as pack sizes (option v) although this was not considered a high priority

27. The SSRC Secretariat added that a number of questions in connection with food safety behaviours had been added to the FSA's Food Issue Survey (FIS), which investigates approximately 3000 adults measuring attitudes, knowledge and behaviours on food issues. The first results from the FIS are expected at the end of 2010. Further to this the FSA's Social Science Research Unit was developing a study to investigate food safety behaviours in the home which would focus on vulnerable groups. This was expected to report in October 2010. The Committee was asked to consider what they believed the priorities for the Agency were in terms of the recommendations provided by the SSRC and whether it was appropriate to use the recommendations in the planning and prioritisation of FSA research.

28. In their deliberations Members considered:

- That there were two risks to consider in this assessment, firstly the risks associated with behaviours and the other the underlying vulnerabilities. Behaviours were considered to be the primary factor to investigate and Members agreed that options (i) and (ii) would be a priority in terms of determining exposure routes. Members also considered that along with identifying exposure routes, it was also important to find a way of connecting to the group the advice is aimed at, option (iv). There was also a need to further define the population at risk, obtaining data to refine associations would help target those at risk.
- That option (v) was also important as exposure to listeriosis from supermarket products had been highlighted and as such there was an argument to examine particular foodstuffs for *Listeria*, particularly those that are stored after opening. A Member asked whether the FIS picked up shopping trends with age and possible changing habits. The FSA responded that some data

were included in the survey, for example, how people shop, the use of a shopping lists, frequency of shopping. However, there was flexibility in the survey to accommodate further questions if necessary.

29. The Committee concluded that it required more data to inform and assess the high risk associations before any advice could be developed. For example, the current data did not allow for those cases of listeriosis in the over 60s to be linked to specific exposure routes. It was agreed that there was not enough evidence which would alter the advice provided by the FSA website. However it would be beneficial to ensure that the Chief Medical Officers are aware of the issues and that health professionals were informed.

Campylobacter

FSA/BBSRC/Defra *Campylobacter* Workshop

30. In March the FSA presented the Committee with a report on the joint Food Standards Agency/Department for Environment, Food and Rural Affairs (Defra)/Biotechnology and Biological Sciences Research Council (BBSRC) *Campylobacter* workshop⁴² that took place in October 2009. Four sessions were held at the meeting entitled, understanding the organism, *Campylobacter* in poultry, the farm and slaughter house environment and *Campylobacter* in humans. The priorities highlighted at the workshop included the development of an increased understanding of *Campylobacter* in real life and possible interventions, an understanding of *Campylobacter* from bacterium to the bird to human, a focus on routes to reduce levels of *Campylobacter* in chicken and the development of on farm tests. A five year strategy document will be produced as a result of the output of the meeting. This will highlight the priorities for research and will be published by the FSA in April 2010 and will aid the FSA in working towards having a *Campylobacter* risk management programme.

Mycobacterium bovis

***M. bovis*: possible health risks from meat and milk**

31. In March, the FSA briefed the Committee on the issue of *M. bovis* and possible health risks from meat and milk⁴³. Members were reminded that the Committee had previously assessed the health risks to consumers of meat from animals with evidence of *M. bovis* infection in 2001 and 2003. Those assessments focussed on the risks to human health from meat and concluded that the risk, if any, from the consumption of meat was very low. In 2002 ACMSF also considered that there were no concerns in relation to milk and dairy products as legislation and controls adequately covered exposure pathways at that time. In October 2009 the FSA Board requested that the Agency review potential risk to consumers from meat and dairy products from cattle with evidence of *M. bovis* infection as a result of an increased occurrence of *M. bovis* in the UK cattle population. The Board sought reassurance that current control measures were adequate to protect human health.
32. It was highlighted that the number of human *M. bovis* infections per year averages around 30 cases with the trend being stable with a slight decline since 1994. Most human cases are in those born before 1960 suggesting a reactivation of an old infection. The HPA considered that given the small number of human cases, there was no evidence for the bovine epidemic spilling over into the human population. Members were informed that active on-farm bovine TB testing was supplemented by routine meat inspection of non-reactor cattle at commercial slaughter and a series of new control measures introduced in 2004 (EC Reg 854/2004) which covered both ante-mortem and post-mortem inspection. Further to this a gamma interferon blood test for cattle was adopted in legislation in 2006 to enhance sensitivity of bovine TB testing.
33. The Committee was informed that regulation 853/2004 now requires that raw milk should come from animals belonging to a herd that is officially TB free (OTF). If OTF status was lost then milk from reactor cattle was not allowed to enter the food chain and milk from non-reactors had to be pasteurised. Additionally, for cattle in England and Wales producing raw milk for human consumption, Defra require that the herd is annually tested for TB. Scotland currently bans the sale of all raw drinking milk and cream. The FSA is currently funding a project expected to end in autumn 2010 which is investigating the survival of *M. bovis* in raw milk. As milk and dairy products had not been previously assessed in detail by the ACMSF, the Committee was asked whether it necessary to set up a working group to assess potential risks from milk or milk products.

34. In their deliberations Members:

- Highlighted that most cases of TB in humans were currently from those born prior to 1960 and that cases were more likely in UK immigrants. Therefore, evidence for primary infection in the UK under current regulation and treatment of products was considered low. Members added that they were not clear what the FSA required of the Committee since there was no new evidence that would change the current assessment.
- In relation to regulatory changes, raised the issue of what had happened to previous ACMSF advice on animals with visual lesions in lymph nodes not going into the food chain. The Meat Hygiene Service (MHS) responded that the UK had now adopted EU controls to bring it into line with the rest of the EU and that although the UK legislation was implemented in 2006, the recommendation was actually taken forward from 2002. In addition, if an animal was a TB suspect, a more detailed study would be performed to ensure infected meat did not go into the food chain.

35. Regarding the risks from milk the Committee considered that the high level of pasteurisation of milk in the UK ensured that the risk of becoming infected with tuberculosis from milk remained low. It was added that the pasteurisation process had been designed to protect against *M. bovis* and as such it was difficult to see why milk was considered a risk. The Committee, which advises that raw milk should not be made available for public sale, saw no reason to change its existing position on raw milk. Members raised concern that there was a discrepancy in the legislation in the different countries of the UK with some allowing and others banning the use of raw milk.

36. The Committee concluded that current evidence had not shown a need to change the existing risk assessment and so there was no need to establish a subgroup to examine further the risks from raw milk at this time as was suggested by the paper. However, further consideration could be given to this once results from the FSA project on cheese made from raw milk were known. These results are due towards the end of 2010.

***M. bovis*: possible health risks from pasteurised milk and milk products**

37. In September the FSA sought the Committee's views on the potential for pasteurised milk and milk products contaminated with *M. bovis* to enter the food chain and whether the risk has changed in light of the increase in *M. bovis* infection in cattle in the UK⁴⁴. Members were reminded that in March the Committee had agreed that, on the basis of current evidence, no change was needed to the existing risk assessment on meat.
38. The FSA's paper addressed the potential for the presence of *M. bovis* in cow's milk through the occurrence of tuberculous mastitis which was highlighted as rare in the UK. The potential for undiagnosed but infected cows to remain in a herd was also outlined. This can arise from a failure of the tuberculin skin test, which is recognised to be 80% sensitive, and the presence of anergic cows in a herd. The potential for the presence of *M. bovis* in milk is minimised through frequent TB testing and removal of infected cattle, and exclusion of milk from reactors from the food chain. The risk cannot be eliminated as the screening methods are not 100% sensitive and specific, and milk from anergic cattle may enter the food chain. However, tuberculous mastitis resulting in shedding into milk is considered rare and, where it does occur and *M. bovis* infection is unrecognised, the cow is likely to be culled due to chronic mastitis.
39. Details of pasteurisation standards and evidence for the efficacy of pasteurisation on *M. bovis* contaminated milk were presented. It was highlighted that the standards in place provide an adequate safety margin and, in practice, industry often apply higher time temperature combinations for pasteurisation than those laid down in legislation. Some information on microfiltration was given and it was noted that microfiltered milk is always pasteurised as well. A brief update on the status of human cases of *M. bovis* was given noting that less than 1% of human TB cases were due to *M. bovis* and there was no evidence linking these cases with consumption of *M. bovis* contaminated meat or dairy products.
40. In the ensuing discussion the Committee considered that:
- The risk has changed because there is more *M. bovis* present due to the increased incidence in cattle. However, the risk is still acceptably low due to the on-farm controls in place and the efficacy of pasteurisation, validated by the lack of human cases.
 - Some concerns were raised over the potential for failures of on-farm pasteurisation and it was suggested there may be around 100 farms in England and Wales that carry out on-farm pasteurisation.
 - Recent evidence of "D" and "Z" values for High Temperature Short Time (HTST) treatment of milk, as opposed to batch pasteurisation, would be desirable to ensure there was no data gap. The FSA agreed to look into this.

41. The Committee concluded that, in response to the questions posed, the risk from pasteurised milk and milk products contaminated with *M. bovis* has changed but in milk that is properly pasteurised the risk remains acceptably low. However, two potential caveats were highlighted; break-downs of on-farm pasteurisation and further clarification of “D” and “Z” values for HTST milk.

Foodborne Viral Infections

42. The Committee’s subgroup on Foodborne Viral Infections in 1998 published its report which assessed the significance of viruses as agents of foodborne infections in humans. Although the Committee in 2007 agreed to revisit this issue in response to new developments and outbreaks of foodborne viral infections, the need to consider other priorities at that time (such as listeriosis in vulnerable groups) prevented this.
43. In March, the FSA sought the Committee’s views on the risk to human health associated with foodborne viral infections, especially with reference to norovirus⁴⁵. Members were also requested to consider priorities for research and surveillance. To enable a full discussion of issues concerning foodborne viral infections, the Committee was asked to consider setting up a subgroup to facilitate deliberations.
44. Following the FSA’s request, Dr David Brown gave a presentation on the key developments in foodborne viruses over the last ten years stating that since the last ACMSF review in 1998, risk assessments had been carried out into norovirus (2004) and Influenza A and Hepatitis E (2007–2008). Viruses were highlighted as being much simpler organisms than bacteria with important differences in epidemiology as they could only replicate in the cells of the host species. Viruses also tended to be highly infectious with typically 1 to 100 infectious particles required for infection. Hepatitis and norovirus were described as causing the greatest burden of viral foodborne disease in the UK with norovirus observed throughout the age groups. It was estimated that there were 100,000 incidences of foodborne virus infections per year of which 70% were link to norovirus. Five phylogenetic norovirus groups had been identified with 22 genotypes. With reference to human susceptibility and resistance to norovirus, secretor status was determined to be a factor with those with secretor negative status not susceptible to norovirus. Norovirus also had the ability to persist in the human population by two mechanisms, receptor switching and antigenic variation. The role of norovirus typing in disease outbreaks was described highlighting that cases from infected food handlers had been linked to food consumers. However, problems occurred when multiple norovirus genotypes were identified in an outbreak such as from produce affected by sewage.

45. The Committee was informed that most occurrences of indigenous Hepatitis E infection in England and Wales appeared in elderly males, peaking at around 70 years with strains predominantly from Genotype 3. There were currently seroprevalence studies underway to determine the true incidence and burden of infection in the UK. However, it was suggested that there could be as many as 65,000 unidentified cases in the UK. In summary, Dr Brown concluded that priority areas for risk management were norovirus and Hepatitis A in bivalve molluscs, fresh fruit and food preparation. More data were required on quantification such as the prevalence, infectious doses in food and contamination route.
46. In the ensuing discussion Members considered that:
- The data reported on viruses appeared to be from outbreaks and it would be beneficial to have surveillance to look at other foods which may be missed as a potential risk as small outbreaks may go unreported.
 - In light of the information presented it would be beneficial to hold a review of foodborne viral infections. In response it was noted that as the results of the IID2 results would be reported later in 2010, the group that would consider foodborne virus would find the data from this study useful. Additionally it was felt that any review should consider that for enteric viruses, it was hard to distinguish between foodborne infection and infection from other routes. Focusing on foodborne infections may miss the bigger picture as non-foodborne infection was likely to occur more and would impact heavily on the observable epidemiology.
47. The Committee agreed to establish a subgroup to review foodborne viral infections and Dr Brown was invited to Chair the group. Mr Kyriakides was also invited to be a member of this group. Committee members who wished to form part of the subgroup were asked to contact the secretariat. It was considered important that food remained the foremost issue for discussion by the subgroup as this was the remit of the ACMSF. It was emphasised that the Terms of Reference must cover all aspects which impacted on food.

Waste and Resources Action Programme (WRAP): Risk assessments

WRAP: Risk assessments on the use of source segregated composts in agriculture

48. In March the Committee was requested to assess the risk assessments, presented and carried out under the Waste and Resources Action Programme (WRAP): Confidence in Compost Programme, in terms of

microbiological food safety⁴⁶. The risk assessments considered the use of composting and biogas treatment to dispose of waste containing meat and the use of source-segregated composts in UK agriculture. Members were reminded that the Committee had previously given consideration to the issue WRAP: Risk assessments on the use of source segregated composts in agriculture at the September 2009 ACMSF meeting.

49. Dr David Tomkins (WRAP) gave an introduction on WRAP describing the company as a “not for profit” organisation, backed by government funding, that helps stakeholders reduce waste by the development of sustainable products. It was highlighted that over 2.5 million tonnes of compost were produced in the UK each year with approximately 1 million tonnes made from feedstocks that did not include waste food. Approximately ¼ million tonnes was made from feedstocks that did include some waste food with the majority used for arable crops. It was added that the compost industry was heavily regulated with 55% of the industry either compliant or working towards attaining BSI PAS100 specification for composted materials. To provide reassurance that the assumptions used in a 2002 catering waste risk assessment were still valid three different risk assessments had been performed. They covered garden wastes, waste food and “other” wastes.
50. Dr Paul Gale (VLA) provided an update of the VLA’s 2002 risk assessment which estimated risks to grazing livestock from food-borne pathogens. Exotic viruses, endemic bacteria, spore-forming bacteria, protozoa, avian influenza virus, Methicillin Resistant *Staphylococcus aureus* (MRSA), scrapie, porcine circoviruses and porcine parvoviruses were considered in the assessment. The model was updated to include data on illegally imported meat into GB, which was estimated to be 11,875 (4,398 - 28,626 CI) tonnes a year. These meats introduced risks from foot and mouth, classical swine fever, swine vesicular disease and African swine fever. Other key data included, a *Campylobacter* count in fresh chickens at retail of 85,000, a total *E. coli* O157 loading on sheep meat and beef of 1.2×10^{12} per year. The amount of raw meat discarded was judged to be 3.3% for poultry, 2.1% pig meat, 1.7% beef and 3.2% lamb. The amount of food waste produced in the UK was 6.7 million tonnes per year of which all was assumed to be composted. In general the updated risk assessment was considered more precautionary than that performed in 2002.
51. Results showed that due to composting one would expect to see one case of classical swine fever virus in pigs in 1528 years, one case of African swine fever virus in 102,491 years, one case of foot and mouth disease (FMD) in 1.7 million years and one case of swine vesicular disease virus in 47 million years. Therefore risks from exotic viruses from imported meat were low, and were reduced significantly by the composting process. For the faecal bacteria, salmonellas, *E. coli* O157 and campylobacters it was concluded that the risks to humans from faecal pathogens through the consumption of vegetable crops treated with food-waste compost was remote. Further, the risk to humans from *Clostridium botulinum* spores on fresh vegetables from soil or compost-amended soil

was also low due to spores being unlikely to germinate in aerobic composting conditions.

52. Dr Philip Longhurst (Cranfield University) presented data on a model that considered and prioritised combinations of source to pathway to receptor exposure risks. Waste scenarios included green waste, food waste and shellfish waste. Hazards included persistent toxic elements, phytotoxins, marine biotoxins and pathogens. Humans and animals were assumed to be exposed to these hazards through ready to eat crops, combinable crops, harvested forage and grazed forage. The model used the worst case scenario to ensure all were protected and assumed that the compost met the requirements of the PAS100 standards. An example of model use was provided for *E. coli* O157 highlighting parameters such as decay of the pathogen, uptake and transfer to crops, washing the crop, re-growth of pathogen during storage and the amount of pathogen to which an adult or child would be exposed. Results from the model showed that after screening all risk pathways, *E. coli* O157 was identified as the highest risk. However, the outcome was still very low in terms of risk with the result below that of a theoretical safe dose.

53. In the ensuing discussion the Committee considered that:

- There appeared to be an emphasis on modelling bacteria that would naturally be killed by composting rather than the more resistant forms of pathogen such as spores. Dr Gale added that the model did look at botulism and Transmissible Spongiform Encephalopathies (TSEs) as potential issues and it was suggested that *Clostridium* spp. could be considered but noted that looking at one thermo resistant spore did give a feel for what would happen with other similar pathogens.
- Clarification was required regarding the by-pass route in the composting process for the two models presented. There appeared to be a by-pass route for the segregated waste stream but not for the others. Further, for the Cranfield Model it was not clear why 1000 cfu/g was used for *E. coli* in the study as a worst case scenario. In response, Dr Gale stated that the models were looking at different scenarios and were trying to answer different questions hence the different by-pass routes. Dr Longhurst added that the Cranfield Model assessed a compost product at the PAS100 standard and therefore used the standards required for that product. By-pass would have already taken place and would not affect the output of the model.
- The models did not appear to consider a worst case scenario as suggested, with models primarily looking at animal health rather than human. In response Mr Steve Wyllie (Defra assessor) informed Members that the remit of the original research project was to focus on issues which were of high importance at that time, mainly exotic animal diseases such as FMD. Further, there was a

need to consider a wider range of pathogens such as Hepatitis-E in pig waste and *Cryptosporidium* spp. and *Giardia* spp. from cattle. Assumptions used regarding the washing of vegetables were also not correct. For example, lettuce may be sold whole rather than the “bagged” scenario used in the model. Moulds which were detrimental for immune-compromised patients were also not considered. The issue of whether the views of consumers were considered in relation to the acceptability of food waste being used as compost. This was particularly relevant if compost derived from meat was used on food crops. Dr Longhurst explained that although such a study did not form part of this work, studies had been performed and were available separately.

54. Given the short notice between circulating the substantial papers on this subject, the large number of questions raised and the meeting taking place, it was agreed that the risk assessments be considered by selected Members outside of the meeting who would then report back at a future meeting. It was agreed that Mr Kyriakides, Mr Bassett, Prof Coia, Dr Holliman, Prof Hunter and Mrs Buller would give further consideration to the documents.

ACMSF response to the WRAP risk assessment on the use of source segregated composts in agriculture

55. In September, Mr Bassett was invited to introduce the group’s conclusions on the WRAP risk assessments for the Committee’s consideration⁴⁷.
56. Mr Bassett summarised the group’s broad conclusions, gaps identified and key points. Generally the methodology was found to be robust. The process was however, considered over complex and it was noted this can reduce transparency. Some issues were identified around uncertainty and the risk ratios approach used which was not considered entirely appropriate when approaching the threshold of what is accepted as a ‘safe dose’. It was suggested, a more thorough assessment was needed as you approach these threshold levels and *E.coli* O157 and *C. botulinum* were highlighted as organisms where this was perhaps required. For other organisms the level of safety demonstrated indicated the risk was very low. Some gaps in the hazard identification process were noted, specifically the lack of consideration of spore forming organisms, fungi and encysted parasites. The other major omission was the lack of assessment of by-pass or system failure in the risk assessment which assumed 100% compliance.
57. In reference to the March discussion it was highlighted that an update on the industry numbers compliant with BSI PAS100 specification, including the number working towards compliance, be given in the revised WRAP document. Mr Wylie (Defra assessor) noted that the BSI standard was probably applied by the Environment Agency under environmental rules and where food waste or animal by-products were involved in the

processing. Authorisation would be required by Defra under the animal by-products legislation.

58. The Committee endorsed the response drafted by the group highlighting that their concerns were reflected in the paper. Mr Bassett was requested to attach a summary of the broad conclusions he presented to the paper that would be forwarded to WRAP.

Literature review on microbiological hazards associated with biltong and similar dried meat products

59. In March, the FSA brought to the Committee's attention the issue of incidents involving the production of biltong in the UK⁴⁸. Due to the number of incidents involved the Agency felt that more information was required on the microbiological hazards in order to provide manufacturers and local authorities with practical advice on safe manufacturing practices. Campden BRI was commissioned to perform a literature review of available data on biltong plus similar dried products, and in particular jerky.
60. Dr Dean Burfoot (Campden BRI) gave an overview of the available literature on biltong and jerky. Biltong was described as being an uncooked, marinated (acid and salt), low temperature air dried product formed from strips of meat. The product was typically marinated for 18 to 24 hours at 4°C and dried at 35°C at 30% humidity for 6 days. Final product had a moisture content of between 20 to 30%. Biltong was described as being microbiologically stable when it had a water activity below 0.7a_w with a linear relationship observed between moisture content and added salt for microbiological stability. Typically the product had a 6% salt content and 25% moisture content. Production of jerky was shown to follow a similar process. However, reformed meat was used which was heated, effectively cooking the product before drying. Recommendations from the United States Department of Agriculture (USDA) required that the meat was heated to 71°C in moist heat or marinade and dried to 0.85 a_w. If 71°C could not be guaranteed, post-dry heat was the required at 135°C for 10 minutes.
61. Dr Linda Everis (Campden BRI) described the microbiology of biltong and highlighted typical cfu values for viruses, bacteria, yeast and moulds. Research was reviewed that demonstrated that the effect of different production factors such as salting, marinating, drying and temperature were not inhibitory to certain pathogens, however, in combination they were found to be by the hurdle effect. Reduction in pathogens in processing (marinating and drying) was shown in *Salmonella* (2 to 3 log), *E. coli* (2 to 3 log), *L. monocytogenes* (2 to 4.5 log) and *S. aureus* (1 to 6 log). Reduction increased further with a drier product. Certain pathogens were also shown to have long survival times in biltong with *S. Newport* lasting for up to 24 months, *S. Dublin* 6 months and *S. aureus* 64 days.

For jerky only two surveys were reported with neither showing the presence of *E. coli* O157 or *S. aureus* but *Salmonella* was found in 0.3% samples and *Listeria* in 0.5% of samples. Again, marinating and drying were effective in reducing pathogens. Research showed that when the processes described by the USDA were followed, *Salmonella*, *E. coli* and *L. monocytogenes* were not observed in the final product.

62. Mr Burfoot concluded that there was currently no legal definition of, or specific production guidance, for biltong although there was a range of guidance on jerky mainly from the US and New Zealand and a prescriptive definition from the USDA.
63. Responding to the comment that there was no legal definition for biltong a Member noted that biltong would still fall under the normal UK food safety requirements in terms of enteric pathogens. It was highlighted that there were other similar products which do not have a designed standard, such as salami and Parma ham, so it was important not to demonise biltong when it may have similar risks to those which are more widely known. It was also highlighted that major producers were more likely to have a product quality management process such as a Hazard Analysis and Critical Control Point (HACCP) plan whereas the greatest concern would be with the small producers who do not have such plans.
64. On the question of whether biltong products re-absorbed moisture after the drying process. Mr Burfoot responded that there was no literature on this. However, work at Campden had found that storing the product in different environments did affect the distribution of moisture throughout the product. This suggested the need to provide advice on the packaging for the storage of the product and the time for which it should be consumed after opening.
65. Members agreed that the documents provided information for the FSA to write advice and guidance on the production of jerky. However, there was no similar evidence provided for the safe production of biltong. The protocols also described in the documents were particular to the South African environment and were therefore not directly applicable to the UK.
66. The Committee concluded that, at the present time, there was insufficient evidence for the FSA to provide advice to food producers and local authorities on the production of biltong. More experimental evidence was required on the effect of processing techniques before risks could be assessed. There was also a need for clarification on outbreaks said to be associated with biltong to ensure that the epidemiology about the source of infection was accurately modelled and source identified.

Possible health risks from consuming chicken liver pâtés

67. In September, the FSA briefed the Committee on the possible health risks from consuming chicken liver pâtés⁴⁹. It was explained that in 2009 and

2010 there had been an apparent increase in *Campylobacter* outbreaks in England, Wales and Scotland associated with consumption of chicken liver pâté/parfait, with nine of the 15 outbreaks in the period 2005-2009 occurring in 2009. Undercooking of the pâté or parfait was identified as a key factor in causing a number of the outbreaks. Five outbreaks had been reported up to week 28 of 2010. The FSA issued advice to caterers on the safe handling and cooking of livers in July 2010.

68. In light of this information Members were asked to consider whether the outbreaks were linked to the overall reported increase in *Campylobacter* cases, were there changes in the sourcing, preparation or consumption of these types of pâté products and was there any evidence of changes in poultry production practices which may influence the type, level or frequency of *Campylobacter* contamination?
69. Members requested clarification on the outbreak associated with pâté that had been cooked to 100°C. The FSA explained that the situation highlighted involved a product prepared by a catering company outside the UK, was in contrast to the other outbreaks where there was some suggestion the livers had not been properly cooked. This suggested illness could have been caused by post-processing product contamination. The FSA was asked whether proactive targeting of the relevant food hygiene messages had been carried out and whether the FSA had issued advice for enforcement officers. The FSA reported that advice for enforcement officers was judged on a case by case basis. It was added that checks would be made if any other specific targeting of the hygiene messages had been issued.
70. Members considered that:
- The practice of injecting blood into pâté to make it pink had been raised in previous Committee discussions on pâtés and might need to be reconsidered.
 - Informal feedback from environmental health officers suggested a greater use of experimental food processing using high-risk techniques, which might need consideration under ACMSF horizon scanning discussions. Furthermore it was considered difficult to get heat to flow through a pâté on cooking. The Committee noted that there appeared to be a change to traditional pâté preparation practices, moving away from cooking livers in a pan and then in a bain-marie to cooking them on a stove followed by blending and chilling. It was also suggested that in some cases food safety messages might not be reaching the intended target with some caterers unaware of recent FSA advice on chicken liver pâté and some chefs recommended leaving cooked livers pink in the middle. This indicated consumers and caterers might not appreciate that *Campylobacter* can be present in the centre of a solid organ. It was suggested that reducing consumer acceptance of undercooked

livers might be effective as evidenced by work in the US on VTEC contamination, encouraging consumers to reject pink burgers.

- In some circumstances *Campylobacter* in poultry tissues might be more significant than surface contamination and since the liver acts as a filter for everything from the gut the liver might, in certain cases, be an appropriate place to monitor *Campylobacter* in chicken. On the source of chicken livers used in UK catering, it was indicated that one of the major UK poultry producers is known to provide chicken livers to the wholesale market.
- Sufficient data may be available to enable completion of a risk assessment on the issue. This could be used to provide information on a thermal processing method that would render the products acceptably safe.
- The available descriptive, microbiological and analytical evidence linking pâté to the outbreaks would have been useful in the paper presented. It was also noted that it was not known if the outbreak strains were similar to circulating *Campylobacter* strains or whether outbreaks could be linked to the appearance of new strain.

71. The Committee's wide-ranging discussion raised several hypotheses for the increase in outbreaks including changes in culinary fashions, customer demands and advice not reaching the intended target. It was agreed that this issue could be amenable to a formal risk assessment.

Foodborne Disease Strategy

72. In March, the FSA briefed the Committee on its Foodborne Disease Strategy (FDS) 2010-2015⁵⁰. Members had seen and commented on the strategy during the consultation period that took place between June and September and the FSA's presentation therefore focused on the background to development of the programme, its context in relation to other Agency work and identification of FDS priorities.

73. The FDS is one of a suite of complementary Agency work programmes including the Safer Food Better Business (SFBB) and Food Hygiene Delivery Programmes delivering FSA strategic objectives on food safety. These programmes have grown and changed over time and the opportunity was therefore taken to re-focus the FDS to tackle specific issues around reducing foodborne disease. The FDS 2010-2015 priorities were shaped through a Food Chain Analysis project which looked at the major microbiological causes of foodborne disease and analysis of high risk-food chains.

74. The new strategy comprises three main work strands, two risk management programmes on *Campylobacter* and *Listeria* and a refreshed Food Hygiene Campaign to deliver consumer awareness aspects. Work

on other pathogens such as *Salmonella*, norovirus and *E. coli* O157 is ongoing but some of this is being taken forward under other research programmes and through work with external partners.

75. The Committee raised a number of issues in the ensuing discussion.

- There were concerns that reorganisation of the health service could affect accessibility to data for monitoring human foodborne disease. The FSA responded that this had already been identified as a key risk in delivery of the programme and were making links with the Department of Health and the Health Protection Agency to ensure the FSA has a voice in this process. It was highlighted that until the White Paper was published it was difficult to comment on the effect of proposed reorganisation but the Committee may need to consider this issue at a future meeting or teleconference depending on the consultation timings. It was also noted that following the Comprehensive Spending Review Local Authorities, who had assisted in delivering some aspects of the FDS, were likely to experience reduced resources and there would potentially be restrictions on communication campaigns.
- The high public health burden due to norovirus infection was discussed and whether or not this was reflected effectively by the FDS pathogen ranking. The FSA responded that a specific model was used to calculate the foodborne component of disease using best available data to produce the rankings but it was recognised that norovirus attribution data were poor. A cross-government approach would possibly be the best means of addressing the norovirus burden as it is wider than simply a foodborne viral infection issue.
- Several Committee Members were complimentary about the strategy in terms of its clear focus and pathogen-specific, risk-based approach. The low priority for *C. perfringens* was questioned but it was noted that the results of the Second Infectious Intestinal Disease (IID2) study would shed some light on the health burden due to this pathogen. It was also agreed that lessons could be learnt from the US experiences about their *Listeria* zero-tolerance strategy and from New Zealand and Canada about their experiences of *Listeria* risk management.

76. The Committee endorsed the strategy and its development and welcomed the inclusion of the work to understand the foodborne component of norovirus. However, Members highlighted that there was a need to improve hospitalisation data for norovirus. The Committee indicated that they might need to revisit the effects of organisation change and spending cuts in 2011.

Food Hygiene Delivery Programme

77. The FSA briefed the Committee on its Food Hygiene Delivery Programme (FHDP)⁵¹. The programme was created to drive forward the FSA's response to the Public Inquiry into the 2005 Wales *E. coli* O157 outbreak and address specific recommendations for the FSA. As part of the programme a review of regulation cultures and behaviours was commissioned to investigate how a culture of sustained compliance could be supported by the regulator and by Food Business Operators (FBOs). In the review a range of activities were found to contribute towards business compliance including manager commitment, high quality training, peer group support and in-house expertise and it was recognised these activities are, in some cases, a particular challenge for small businesses. In terms of regulator culture, clear communication, incentivisation and use of a range of methods were considered important. The Agency will reflect on the review findings and ask some difficult questions about where to allocate its resources in order to drive up standards across the piece and deliver food hygiene.

78. In the ensuing discussion the Committee noted that:

- The impact of conflicting priorities, such as waste reduction, on FBO food safety behaviours should be considered. The FSA responded that it would need to reflect on how to address issues of segmentation. For example some recommendations under Safer Food Better Business (SFBB) assisted FBOs in improving in areas such as stock management and waste reduction. In response to a query about how culture change would be tackled the FSA highlighted that it was important to deal stringently with non-compliant businesses and developing a compliance and enforcement strategy would allow better targeting of resources relative to the risk.
- The benefits and risks of a joined up approach with the education system to deliver increased awareness and food hygiene skills were discussed briefly. In response to the ACMSF Chair's query on links between the FDS and the FHDP the FSA commented that links between operations and policy need to be clear and explicit within the FSA and the FDS would be informed by the FHDP.

79. The Committee noted that conflicting priorities for food businesses were an important consideration for delivery of food hygiene as were links with education and influencing behaviours.

Horizon Scanning

80. Following consultation with Members on potential topics for horizon scanning, the Committee was invited to comment on the summary of

topics presented considering mechanisms by which to address them.⁵² Members were asked whether the topics were still right, how they should be prioritised and what specific aspects should be included.

81. The Committee considered some of the proposed areas very broad and suggested a need to prioritise and be more specific about which aspects should be looked at. Some Members wanted to focus on specific organisms, for example, Hepatitis E, *C. difficile* and norovirus, to investigate to what extent these are foodborne diseases. Other suggestions were for a non-pathogen specific approach, for example work on antimicrobial resistance and changes in persistence and dissemination of organisms. Other horizon scanning topics raised included investigating changes in: the processing of foods, food procurement in the catering sector and increased on-site food production for school catering.
82. The ACMSF Chair requested that a brainstorming session be arranged to discuss the topics in more detail and report back to the main Committee in January 2011 with some concrete proposals and prioritisation. Mr Kyriakides, Prof McDowell, Mr Bassett and Mrs Buller were invited to take this forward.

Surveillance

UK-wide survey of microbiological contamination of raw red meat on retail sale

83. The FSA briefed Members on the outcome of its UK-wide survey of microbiological contamination of raw red meat on retail sale published in September 2010⁵³. The aim of the survey was to establish the prevalence of a range of foodborne pathogens and indicator organisms in red raw meat at retail. Key findings were that:
 - The survey results indicate that *Campylobacter* spp. contamination on red meat is very low. *Campylobacter* was detected on the surface of only 21 of the 5,998 meat samples tested giving an overall prevalence of 0.36%; it was more prevalent in lamb meat than other types of meat. The predominant *Campylobacter* species was *C. jejuni*, which was detected in 20 of the 21 positive samples, *C. coli* being detected in the other.
 - *Salmonella* spp. was detected on the surface of only 15 of the 5,998 meat samples tested giving a prevalence of 0.24%. Of the red meats sampled, pork exhibited the highest prevalence rate for *Salmonella*. The most predominant *Salmonella* serotype found in the red meat tested was S. Cerro which was detected in 7 samples.
 - *E. coli* was detected on the surface of 1,970 of the 5,998 red meat samples tested giving a prevalence of 32.94% and was more

prevalent on pork (36.4%) than the other meat types. However, *E. coli* O157, the most significant pathogenic type of *E. coli*, was only detected on 1 sample (beef) giving a prevalence of 0.02%.

- *Listeria* spp. was detected on the surface of 619 of the 5,998 samples tested resulting in an overall prevalence of 10.62%. Non-pathogenic *L. welshimeri* was the most predominant species confirmed being found in 349 (6.01%) samples. *L. monocytogenes* was found in 185 samples giving a prevalence of 3.17% and was more prevalent on lamb and beef. The majority of *L. monocytogenes* (90.3%; n=167/185) detected was present at less than 10 cfu/meat sample with only 2.4% (n=4/185) samples greater than 100 cfu/meat sample. These results confirmed that the levels (cfu) of *L. monocytogenes* found on the surface of whole cuts of retail red meat were low and below the level of concern for ready to eat foods (>100 cfu/g).
 - *C. perfringens* was detected on the surface of 605 of the 5,998 red meat samples tested giving a prevalence of 9.99% and was more prevalent on beef. Most of the *C. perfringens* (85.9%; n=521) detected was present at less than 10 cfu/meat sample. Sixty eight (11.4%) and 15 (2.6%) had levels of 10-100 cfu/meat sample and 100-1,000 cfu/meat sample respectively whilst only 1 (0.2%) sample had *C. perfringens* at 1,000-10,000 cfu/meat sample. No meat samples had *C. perfringens* levels greater than 10,000 cfu/meat sample; levels of over 10^5 cfu/g are needed to cause illness.
 - The prevalence of the non-pathogenic microorganisms ranged from 7.18% to 95.88%.
84. As the raw meat would undergo cooking prior to consumption the low levels detected were not considered to be of major concern. In response to a question about survey sampling structure and confidence intervals the FSA Statistics Advisor responded that sampling was based on market share data and confidence intervals for the prevalence figures given were approximately +/- 2% for each meat type. It was also noted that *S. aureus* was referred to as pathogenic in one part of the summary but subsequently included in the prevalence range for non-pathogenic microorganisms. The validity of quoting a prevalence range for different microorganisms was also questioned.
85. Some Members considered that the risk in raw products should not be dismissed as pathogen multiplication and cross-contamination could occur during handling and storage of the food and even though pathogen levels detected were low they would still be a risk for some consumers. However it was also suggested that industry should be commended for maintaining the low pathogen levels found and whilst we should strive to reduce these further the findings were reassuring given the practicalities of processing a live animal into a piece of meat.

86. The Committee commented that the survey's sampling plan would have been a useful addition to the paper they considered. It was also highlighted that it would have been interesting to consider the data from this report alongside the poultry survey findings.

The isolation of *Campylobacter* spp. from food and environmental samples

87. Following the publication of the FSA's UK-wide survey of *Campylobacter* and *Salmonella* contamination of chicken at retail sale, the Committee agreed to the proposal of its Surveillance Working Group (SWG) to draft a commentary paper on surveillance of retail chicken in the UK outlining some issues that had arisen from recent FSA *Campylobacter* surveys relating to isolation methods and approach. The aim of the paper was to provide recommendations for the FSA to consider for their future surveillance work.
88. Mr Kyriakides presented to the Committee the paper on the isolation of *Campylobacter* spp from food and environmental samples.⁵⁴ Mr Kyriakides explained that the paper pulled together some of the concerns around isolation of *Campylobacter* from previous surveys. The paper was not intended to be an extensive review of methods but highlighted elements that need to be considered for reliable isolation of *Campylobacter*. Members were asked to approve the paper for forwarding to the FSA.
89. It was noted that although the paper suggested further research was needed, a number of recommendations could be made at present and routine protocols for food and water practitioners could be drawn up. It was clarified that one of the aims of the paper was to draw attention to considerations such as the sensitivity and specificity of methods when considering research and survey specifications. Mr Kyriakides suggested that a more comprehensive review of methods might be required which could be supported by further research particularly on the isolation of *Campylobacter* from poultry.
90. There was some discussion on molecular detection methods. It was suggested that, where *Campylobacter* detection was the aim, molecular methods may be more reliable than culture-based methods but they would not be appropriate where it was important to establish whether organism levels are of clinical significance. It was also suggested that if further work was undertaken, methods which do not require eight hour incubation should be considered as this was not very practical for commercial laboratories. Mr Wyllie (Defra assessor) stated that it would be desirable to agree on a single *Campylobacter* isolation method to allow trend analysis and if the EC do introduce harmonised monitoring for *Campylobacter* the UK may wish to be in a position to influence discussions on appropriate methods.

91. The Committee agreed to submit the paper to the FSA noting that it was not a systematic review and that a systematic review of methods might be required.

Epidemiology of Foodborne Infections Group

92. The FSA updated the Committee on the deliberations of the Epidemiology of Foodborne Infection Group (EFIG) at their May 2010 meeting⁵⁵. Key items highlighted were the January 2009 to December 2009 figures for *Salmonella* in livestock. A fall in *Salmonella* in chickens, pigs and sheep was reported with a rise in *Salmonella* reports in cattle. There were only 19 reports of *S. Enteritidis* in 2009 contrasting with 250 reports of *S. Typhimurium*. There were eleven reports of the monophasic *Salmonella* 4,5,12:i:- in pigs in 2009 compared with eight reports in 2008. This is an emerging strain across Europe which has characteristics in common with *S. Typhimurium*. EFSA have set up a working group to look at the emergence of *S. Typhimurium*-like strains. Concerning human data it was highlighted that laboratory reports continue to decline for *Salmonella* but a significant rise in *Campylobacter* cases was reported in 2009. There was a slight increase in *Listeria monocytogenes* reports for the UK in 2009. The largest increase was in England. Reports of *E. coli* O157 increased in 2009 in part due to the Godstone farm outbreak and increased ascertainment in the autumn. The number of foodborne outbreaks of all agents appeared to have increased dramatically in 2009 but this should be considered in the context of the more vigorous outbreak ascertainment follow-up system implemented by the HPA and enhanced surveillance for VTEC.
93. The FSA provided some background to the establishment of EFIG, its membership, remit and frequency of meetings and explained that following discussions at the May meeting on the role and future of EFIG the Group wished to ask ACMSF to comment on the input it received from EFIG. The Committee considered that the information provided by EFIG was useful to inform them about trends and suggested that future update papers include a short bullet point summary of important trends and some graphs and figures. It was noted that the Human Animal Infections Risk Surveillance Group (HAIRS) has some similarities with EFIG but their remits do not overlap as HAIRS focuses more on emerging organisms.
94. The Committee commented that the updates from EFIG were valued and the group would like some summary data as graphs or tables to judge trends and, where possible, inclusion of denominator data in terms of sampling and populations.

General Papers

Freedom of Information

95. During 2010 a request was made to ACMSF seeking information on the Committee's staffing, pension arrangements, travel policy and submissions to Government by ACMSF. There was also a request for copies of information submitted by the Committee to central government departments and/or Government ministers pertaining to the government's Comprehensive Spending Review and the Public Bodies Review. The Secretariat responded to these requests.

Future Meetings

96. Members were reminded of the proposal to move to three meetings a year starting at lunchtime. The 2011 ACMSF meetings would be held on the 20 January, 18 May and 22 September. This proposal will be reviewed and if required the Committee could revert to four meetings a year.

Information papers

97. 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 2010 were:

- Botulism Outbreaks and Toxin Types in Cattle, Sheep and Goats, 2009 (ACM/984)
- UK Zoonoses Report 2008 (ACM/985)
- Update from other Scientific Advisory Committees (ACM/986 and ACM/1004)
- Items of possible interest from the literature (ACM/987)
- EFSA Survey on *Campylobacter* and *Salmonella* in chicken in the EU (ACM/988)
- Food 2030 (ACM/989)
- FSA Strategic Plan 2010-2015 (ACM/990)
- UK-wide survey of the prevalence of Johne's disease in UK dairy herds (ACM/1002)
- Annual Report of Incidents, 2009 (ACM/1003)
- Items of possible interest from the literature (ACM/1005)

Chapter 3: A Forward Look

Future work programme

98. The Committee will keep itself informed of developing trends in relation to foodborne disease through its close links with the Food Standards Agency and the Health Protection Agency. A continuing task will be to respond promptly with advice on the food safety implications of any issues, which may be referred to the Committee by the FSA.
99. Work will continue by the *Ad Hoc* Group on Vulnerable Groups on behalf of the Committee to consider the risks to humans posed by *Toxoplasma* in the food chain and the Committee will publish its report on this work following public consultation.
100. The newly established *Ad Hoc* Group on Foodborne Viral Infections will review current information on viruses in food.
101. The Committee, through its standing Surveillance Working Group, will continue to provide advice as required in connection with the Government's microbiological food surveillance programme and any other surveillance relevant to foodborne disease.
102. The Committee will continue its assessment of the risks associated with *M. bovis* in meat and milk through consideration of the possible health risks associated with unpasteurised milk and milk products.
103. The Committee will consider proposals for increasing the openness of its *Ad Hoc* and Working Groups.
104. The Committee will consider the recommendations made following the quinquennial review of the ACMSF and provide a response to the recommendations.
105. The Committee will continue to keep abreast of Government horizon scanning activities and initiatives, and their potential impact on the ACMSF's future work programme. The Committee will also undertake its own horizon scanning activities to identify potential future microbiological food safety risks.

Annex I: 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.

Ad Hoc Group on Vulnerable Groups

To examine the potential risks to vulnerable groups including the elderly in relation to the microbiological safety of food by:

- considering factors that make people vulnerable in order to define vulnerable groups in relation to foodborne disease;
- identifying key hazards for key vulnerable groups for review;
- assessing the impact of changing patterns of food consumption and behaviour on risks to these groups;
- assessing/reviewing the value/adequacy of current advice and controls and whether it is appropriate;
- advising the ACMSF on the need for changes in advice/recommendations on vulnerable groups and identifying gaps/research needs.

Ad Hoc Group on Foodborne Viral Infections

- Assess the extent of viral foodborne infection in the UK – with particular reference to norovirus and hepatitis E. Including discussion on the issues surrounding emerging risks.
- Describe the epidemiology, sources and mode of transfer of foodborne viral infection.
- Agree a framework outlining the key criteria for assessing the foodborne risks posed by viruses.
- Review the recommendations from the 1998 report and the Governments' responses.
- Identify practical options that might exist, or be developed, for the prevention and control of foodborne transmission. Including communication strategies to target the industry and consumers.
- Assess the implication of new technologies for public health and control of foodborne viruses.
- Identify data gaps and research priorities where it would be valuable to have more information.
- Report on these matters by January 2013.

Membership Tables

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group
Chairman				
Professor S J O'Brien	Professor of Health Sciences & Epidemiology, School of Translational Medicine, University of Manchester	✓	✓	✓
Members				
Mr J Bassett	Team Leader – Microbiological Safety, Unilever Safety & Environmental Assurance Centre	✓		
Dr D W G Brown	Director, Virus Reference Department, HPA Centre for Infections, 61 Colindale Avenue, London NW9 5HT	✓		✓
Mrs V Buller	Catering Adviser. School Food Consultant Service Improvement Consultant	✓		
Professor J Coia	Consultant Microbiologist, NHS Greater Glasgow and Clyde	✓	✓	
Mrs Rosie Glazebrook	Consumer representative	✓		

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		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group
Dr R E Holliman	Consultant and Reader in Clinical Microbiology, St George's Hospital, London	✓		✓
Professor T J Humphrey ¹	Professor of Veterinary Zoonotic Bacteriology, University of Bristol	✓	✓	
Professor P R Hunter ²	Professor of Health Protection, University of East Anglia	✓		✓
Mr A Kyriakides	Head of Product Quality, Safety & Supplier Performance, Sainsbury's Supermarkets	✓	✓	✓
Professor D McDowell	Professor of Food Studies University of Ulster	✓		
Mr P McMullin	Senior Veterinarian & Managing Director, Poultry Health Services	✓		
Dr S Millership	Consultant in Communicable Disease Control, Essex Health Protection Unit and Consultant in Microbiology, Princess Alexandra Hospital, Harlow	✓		
Mr D Nuttall	Catering Manager Harper Adams University College	✓		

¹ Professor Humphrey chairs the Surveillance Working Group

² Professor Hunter chairs the Newly Emerging Pathogens Working Group

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		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group
Mrs J Morris	Principal Policy Officer (Food), Chartered Institute of Environmental Health	✓		
Professor P H Williams	Professor of Microbiology, Dept. of Genetics, University of Leicester	✓		
Co-opted Member				
Dr C Bell			✓	
Assessors				
Mr S Wyllie	Department for Environment, Food and Rural Affairs	✓		✓
Ms Liz Redmond	Food Standards Agency	✓		
Dr S Neill	Agri-Food Institute and Biosciences Institute, Northern Ireland	✓		
Dr J McElhiney	Food Standards Agency (Scotland)	✓		
Mr S Wearne	Food Standards Agency (Wales)	✓		
Secretariat				
Administrative Secretary				
Ms G Hoad	Food Standards Agency	✓	✓	✓
Scientific Secretary				
Dr P E Cook	Food Standards Agency	✓		
Administrative Secretariat				
Dr D Cutts	Food Standards Agency	✓	✓	✓
Dr S Rollinson	Food Standards Agency	✓	✓	✓
Mr A Adeoye	Food Standards Agency	✓	✓	✓
Miss S Butler	Food Standards Agency	✓	✓	✓
Scientific Secretariat				
Mr Adam Hardgrave	Food Standards Agency		✓	

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		<i>Ad Hoc</i> Group on Vulnerable Groups	<i>Ad Hoc</i> Group on Foodborne Viral Infections
Members			
Mr J Bassett		✓	
Dr D W G Brown ³			✓
Professor J Coia		✓	
Mrs R Glazebrook			✓
Professor T J Humphrey ⁴		✓	
Professor P R Hunter		✓	
Dr R Holliman		✓	
Mr A Kyriakides		✓	✓
Mr P McMullin			
Dr S Millership			✓
Mrs J Morris		✓	✓
Professor S J O'Brien			✓
Professor P H Williams			
Co-opted Members			
Dr E Guy	Toxoplasma Reference Unit, Public Health Wales	✓	
Mr Paul Hutchinson	Animal Health and Veterinary Laboratories Agency	✓	
Dr N Cook	Food and Environment Research Agency		✓
Dr D Lees	Centre for Environment, Fisheries & Aquaculture Science		✓

³ Dr Brown chairs the *Ad Hoc* Group on Foodborne Viral Infections

⁴ Professor Humphrey chairs the *Ad Hoc* Group on Vulnerable Groups

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		<i>Ad Hoc Group on Vulnerable Groups</i>	<i>Ad Hoc Group on Foodborne Viral Infections</i>
Assessors			
Mr S Wyllie	Department for Environment, Food and Rural Affairs	✓	✓
Secretariat			
<i>Administrative Secretariat</i>			
Dr D Cutts		✓	
Dr S Rollinson		✓	✓
Mr A Adeoye		✓	✓
Miss S Butler		✓	✓
<i>Scientific Secretariat</i>			
Miss L Knowles			✓

**Annex II : Advisory Committee on
the Microbiological Safety of Food
Register of Members' Interests**

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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
Mr J Bassett	Unilever plc	Employee		
Dr D W G Brown	None		Various	HPA industry-funded research and laboratory investigations
Mrs V Buller	Local Authorities and Schools Association for Public Service Excellence	Catering Adviser and Food Service Consultant Honorary Member of the Local Authority Caterers Association.	Food Standards Agency School Food Trust	Evaluation of Local Authority Food & Hygiene applications and other education related projects. Consultancy
Professor J Coia	None Tesco UK	Ad Hoc medico-legal work on infection related matters Consultancy work	Various	Funding for research projects
Mrs R Glazebrook	None		None	
Dr R E Holliman	Various	Medical Legal work on toxoplasmosis and hospital acquired infection	None	

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Member	Personal interests		Non-personal interests	
	Name of company	Nature of interest	Name of company	Nature of interest
Professor T J Humphrey	British Egg Industry Council McDonalds Ltd	<i>Ad hoc</i> consultancy work <i>Ad hoc</i> consultancy work	Various	Funding for research projects
Professor P R Hunter	Suez International Paris Institute for Public Health & Water Research	Chair of Science Advisory Committee Chair of Board of Directors Medical/Legal advice regarding Travel Health	Chambre Syndicale des Eaux Minérales, Paris	Study of Antibiotic Resistance in Food & Water in France
Mr A Kyriakides	J Sainsbury plc Sainsbury's Supermarkets Ltd Campden BRI	Shareholder Employee Member of Council & Executive	None	
Professor D McDowell	University of Ulster Agrifood Bioscience Institute	Employee Deputy Chair	Companies in food processing/retail	Consultancy/Research funding with industry
Mr P McMullin	Poultry Health Services (PHS) Ltd	Employee and shareholder	Various through PHS Ltd	Consultancy, Veterinary care, Laboratory services
Dr S Millership	None		None	
Mrs J Morris	Chartered Institute of Environmental Health Whitbread plc	Employee and Member Shareholder	None	
Mr D Nuttall	Harper Adams University College	Catering Manager		
Professor P H Williams	None		None	

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Member	Personal interests		Non-personal interests	
	Name of company	Nature of interest	Name of company	Nature of interest
Surveillance Working Group				
Dr C Bell	The United Kingdom Association of Microbiologists – Accreditation Marks & Spencer plc	Convenor Shareholder	Companies in the food manufacturing and retailing sectors Food Standards Agency	Consultant in Microbiology Programme Adviser for B11 VTEC research project
Ad Hoc Group on Foodborne Viral Infections				
Dr N Cook	None		None	
Dr D Lees	None		None	
Ad Hoc Group on Vulnerable Groups				
Dr E Guy	None		None	
Mr P Hutchison	None		None	

**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 Scotland and Wales), the Department for Environment, Food and Rural Affairs, and the Agri-Food & Biosciences Institute, Northern Ireland. 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 are 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 is 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.

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.

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 eg. :

- (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.

GOOD PRACTICE GUIDELINES FOR THE INDEPENDENT SCIENTIFIC ADVISORY COMMITTEES

PREAMBLE

*Guidelines 2000: Scientific Advice and Policy Making*⁵ 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*⁶ (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*⁷ 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.

⁵ Guidelines on Scientific Analysis in Policy Making, OST, October 2005. *Guidelines 2000: Scientific advice and policy-making*. OST July 2000

⁶ Code of Practice for Scientific Advisory Committees, OST December 2001

⁷ 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 Feedingstuffs⁸
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 Environment⁹
Committee on Mutagenicity of Chemicals in Food, Consumer Products and the
Environment¹⁰
Committee on Toxicity of Chemicals in Food, Consumer Products and the
Environment¹¹
Scientific Advisory Committee on Nutrition¹²
Spongiform Encephalopathy Advisory Committee¹³

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.

⁸ FSA Secretariat

⁹ Joint FSA/HPA Secretariat, HPA lead

¹⁰ Joint FSA/HPA Secretariat, HPA lead

¹¹ Joint FSA/HPA, FSA lead

¹² Joint FSA/DH Secretariat

¹³ Joint Defra/FSA/DH Secretariat

Twenty seven principles of good practice have been developed. However, the different committees have different duties and discharge those duties in 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 Researcher¹⁴.
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 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).

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

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

Anergic: Where the immune system is unable to mount a normal immune response against a specific antigen.

a_w : Water activity, the relative availability of water in a substance.

Bacteraemia: Presence of bacteria in the bloodstream.

Biltong: An uncooked, marinated, low temperature, air dried product formed from strips of meat.

BSI PAS100: British Standards Institution's Publicly Available Specification for composted material. This is the national compost benchmark - the minimum requirements for the process of composting, the selection of materials from which compost is made and how it is labelled.

***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 botulinum*:** A Gram-positive, spore forming, neurotoxin-producing obligate anaerobic bacterium. Associated with infant, wound and foodborne botulism.

***Clostridium difficile*:** A Gram-positive, spore-forming obligate anaerobic bacterium that causes diarrhoea and other intestinal disease when competing bacteria in the gut flora are wiped out by antibiotics.

***Clostridium perfringens*:** is a Gram-positive, spore-forming obligate anaerobic bacterium . It is a human pathogen sometimes, and other times it can be ingested and not cause any harm

***Cryptosporidium* spp.:** Cryptosporidium is a protozoan parasite (a tiny organism) that causes an infection called cryptosporidiosis affecting people and cattle. The most common symptom is watery diarrhoea, which can range from mild to severe.

***D value*:** The time required at a certain temperature to kill 90% of the organisms being studied

***Escherichia coli* O157:** A particularly virulent type of *Escherichia coli* bacteria that can cause severe illness

***Giardia* spp.:** Giardia is a parasitic protozoa that causes giardiasis in humans and a range of animals. Transmission can occur via contaminated food or water. Symptoms include acute or chronic diarrhoea.

HACCP: Stands for 'Hazard Analysis Critical Control Point'. It is an internationally recognised and recommended system of food safety management. It focuses on identifying the 'critical points' in a process where food safety problems (or 'hazards') could arise and putting steps in place to prevent things going wrong.

Hepatitis A: A viral hepatitis (inflammation of the liver) caused by the Hepatitis A virus. Infection causes a range of illness from mild through non specific nausea and vomiting through to hepatitis (liver inflammation, jaundice, or icterus) and rarely liver failure. Symptoms and severity of the illness are generally worse the older the person is when they become infected. It is spread by faecal-oral transmission when a person ingests food or drink contaminated by an infected person's stool.

Hepatitis E: A viral hepatitis (inflammation of the liver) caused by the Hepatitis E virus. Hepatitis E is a waterborne disease, and contaminated water or food supplies have been implicated in major outbreaks.

Jerky: A similar product to Biltong but produced using reformed meat which is heated before drying at a high temperature.

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.

Microfiltration: A filtration process which removes contaminants from a fluid by passage through a microporous membrane. The filter pore size used in the microfiltration of milk is typically 1.4µm

Mycobacterium bovis: The bacteria which causes tuberculosis in cattle. *M bovis* can also cause tuberculosis in humans.

Norovirus: A group of viruses that are the most common cause of infectious gastroenteritis (diarrhoea and vomiting) in England and Wales. The illness is generally mild and people usually recover fully within 2-3 days; there are no long term effects that result from being infected. Infections can occur at any age because immunity is not long lasting.

Pathogen: An infectious microorganism, bacteria, virus or other agent that can cause disease by infection.

Phytotoxins: A substance produced by a plant that is toxic or a substance that is toxic to the plant.

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 and pathogenic bacteria, which is highly toxic for other living organisms.

Toxoplasma: A parasitic protozoa which causes toxoplasmosis in humans

Tuberculin: Extracts of *Mycobacteria* used in skin testing in animals and humans to identify a tuberculosis infection.

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

VTEC: Verocytotoxin 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.

Z value: The temperature required for one log reduction in the D-value

Glossary of Abbreviations

ACMSF: Advisory Committee on the Microbiological Safety of Food

BBSRC: Biotechnology and Biological Sciences Research Council
BSI: British Standards Institute

CNS: Central Nervous System

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

ESBL: Extended-Spectrum-beta-lactamase

FBO: Food Business Operators

FIS: Food Issues Survey

FMD: Foot and Mouth Disease

FOI: Freedom of Information

FDS: Foodborne Disease Strategy

FHD: Food Hygiene Delivery Programme

FSA: Food Standards Agency

GACS: General Advisory Committee on Science

HAIRS: Human Animal Infections Risk Surveillance Group

HPA: Health Protection Agency

HTST: High Temperature Short Time

IID: Infectious Intestinal Disease

MHS: Meat Hygiene Service

OCPA: Office of the Commissioner for Public Appointments

OTF: Officially Tuberculosis Free

SFBB: Safer Food Better Business

SEAC: Spongiform Encephalopathy Advisory Committee

SSRC: Social Science Research Committee

TB: Tuberculosis

TSE: Transmissible Spongiform Encephalopathy

USDA: United States Department of Agriculture

VLA: Veterinary Laboratories Agency

VT: Verotoxin

VTEC O157: Verocytotoxigenic *Escherischia coli* O157

WRAP: Waste and Resources Action Programme

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 (2009). Annual Report 2009. Food Standards Agency.

Advisory Committee on the Microbiological Safety of Food: Annual Report 2010

19. Advisory Committee on the Microbiological Safety of Food (1992). Report on Vacuum Packaging and Associated Processes. HMSO, London. ISBN 0-11-321558-4.
20. Advisory Committee on the Microbiological Safety of Food (1993). Report on *Salmonella* in Eggs. HMSO, London. ISBN 0-11-321568-1.
21. Advisory Committee on the Microbiological Safety of Food (1993). Interim Report on *Campylobacter*. HMSO, London. ISBN 0-11-321662-9.
22. Advisory Committee on the Microbiological Safety of Food (1995). Report on Verocytotoxin-Producing *Escherichia coli*. HMSO, London. ISBN 0-11-321909-1.
23. Advisory Committee on the Microbiological Safety of Food (1996). Report on Poultry Meat. HMSO, London. ISBN 0-11-321969-5.
24. Advisory Committee on the Microbiological Safety of Food (1998). Report on Foodborne Viral Infections. The Stationery Office, London. ISBN 0-11-322254-8.
25. 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.
26. 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.
27. Advisory Committee on the Microbiological Safety of Food (2001). Second Report on *Salmonella* in Eggs. The Stationery Office, London. ISBN 0-11-322466-4.
28. 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.
29. Advisory Committee on the Microbiological Safety of Food. Second Report on *Campylobacter*. June 2005. Food Standards Agency. FSA/0964/0605.
30. 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
31. 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.
32. Advisory Committee on the Microbiological Safety of Food. *Ad Hoc* Group on Safe Cooking of Burgers. June 2007. Food Standards Agency. FSA/1183/0607.
33. 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.
34. 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.
35. Committee on Standards in Public Life (Nolan: First Report). May 1995.

Advisory Committee on the Microbiological Safety of Food: Annual Report 2010

36. The Commissioner for Public Appointments. Office of the Commissioner for Public Appointments. Code of Practice for Ministerial Appointments to Public Bodies August 2009.
37. Government Office for Science Code of Practice for Scientific Advisory Committees. December 2007.
38. <http://www.food.gov.uk/multimedia/pdfs/acmsfmemberscop.pdf>
39. Food Standards Agency. Report on the Review of Scientific Committees. 2002. FSA/0567/0402.
40. Advisory Committee on the Microbiological Safety of Food. ACM/979. Update on Listeriosis in England and Wales.
41. Advisory Committee on the Microbiological Safety of Food. ACM/980. Report of the Social Science Research Committee Working Group on *L.monocytogenes* and the Food Storage and Food Handling practices of the Over 60s at Home.
42. Advisory Committee on the Microbiological Safety of Food. ACM/977. *Campylobacter* Strategy Workshop 12-14 October 2009.
43. Advisory Committee on the Microbiological Safety of Food. ACM/981. The possible health risks to consumers of meat and dairy products from animals with evidence of *M.bovis* infection.
44. Advisory Committee on the Microbiological Safety of Food. ACM/995. The possible health risks to consumers associated with *M.bovis* and milk. Part I – pasteurised milk and milk products
45. Advisory Committee on the Microbiological Safety of Food. ACM/978. Foodborne Viral Infections.
46. Advisory Committee on the Microbiological Safety of Food. ACM/976. WRAP: risk assessments on the use of source segregated composts in agriculture.
47. Advisory Committee on the Microbiological Safety of Food. ACM/976. ACMSF response to the WRAP risk assessment on the use of source segregated composts in agriculture.
48. Advisory Committee on the Microbiological Safety of Food. ACM/982. Literature review on microbiological hazards associated with biltong and similar dried meat products.
49. Advisory Committee on the Microbiological Safety of Food. ACM/996. Possible health risks from consuming chicken liver pâtés.
50. Advisory Committee on the Microbiological Safety of Food. ACM/992. Foodborne Disease Strategy 2010-15.
51. Advisory Committee on the Microbiological Safety of Food. ACM/993. Food Hygiene Delivery Programme.
52. Advisory Committee on the Microbiological Safety of Food. ACM/999. Horizon Scanning.
53. Advisory Committee on the Microbiological Safety of Food. ACM/997. UK-wide survey of microbiological contamination of raw red meat on retail sale.

Advisory Committee on the Microbiological Safety of Food: Annual Report 2010

54. Advisory Committee on the Microbiological Safety of Food. ACM/994. The isolation of *Campylobacter spp.* from food and environmental samples.
55. Advisory Committee on the Microbiological Safety of Food. ACM/998. Epidemiology of Foodborne Infection Group.
56. Advisory Committee on the Microbiological Safety of Food. ACM/938. Codex Committee on Food Hygiene.
57. Advisory Committee on the Microbiological Safety of Food. ACM/968. Codex Committee on Food Hygiene.
58. http://www.food.gov.uk/multimedia/pdfs/committee/gacs_slides.pdf
59. Advisory Committee on the Microbiological Safety of Food. ACM/966. Openness – holding open ad hoc and working group meetings

