Advisory Committee on the Microbiological Safety of Food

Annual Report 2018

Advises the Food Standards Agency on the Microbiological Safety of Food

Contents

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

The Committee's terms of reference are: -

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

The various issues addressed by the Committee since its inception are detailed in this and previous Annual Reports[1-26] and in a series of subject-specific reports.[27-47]

Foreword

1. I am pleased to present this report which summarises the work of the ACMSF in 2018. The Committee's activities during the year involved plenary and subgroup meetings. Our work included the fixed-term task and finish Group on Antimicrobial Resistance (AMR), and subgroups on *Campylobacter*, AMR, Newly Emerging Pathogens and the representation of risks.

2. Details of membership, agenda and minutes are published on the ACMSF webpage (https://acmsf.food.gov.uk/).

3. The Committee delivered an authoritative paper on AMR in 2018 via its fixed term task and finish group. The Food Standards Agency Board asked for this group to be established to provide advice to inform responsible use of antibiotics. The report: "AMR in the food chain; research questions and potential approaches" provided recommendations in eight areas (pasture and crops, amendments, animal feed, food producing animals, abattoir and carcass processing, human food and humans). The report was delivered by the target date and was well received. The FSA has outlined steps it will take in progressing the priority recommendations in the report.

4. We reviewed (and endorsed) a draft risk assessment prepared by the FSA on the microbiological risk associated with the consumption of raw drinking milk in the UK.

5. We were asked to revisit our advice on the risk assessment approaches for the handling of incidents involving Shiga toxin producing *E. coli (*STEC) in raw and ready-to-eat foods to support decision making regarding the safety of these products.

6. We considered a draft version of the third report on *Campylobacter* (focussing on developments since the Committee's previous (2005) report) and provided advice to the *Campylobacter* subgroup in the completion of this important report.

7. The Committee was updated on the activities of the Epidemiology of Foodborne Infections Group (EFIG). EFIG updates included: reports of *Salmonella* from livestock species, *Salmonella* National Control Programme and trends in laboratory reports for *Salmonella*, *Campylobacter*, *Listeria monocytogenes* and *E. coli* O157 in humans.

8. In January we held a horizon scanning workshop in Manchester to consider emerging risks associated with microbiological food safety. Through structured discussion we identified a number of topics to be added to the Committee's work plan, including the need to consider the introduction of a 2-dimensional approach to risk assessment to take into account of severity in addition to probability.

9. Other issues/areas considered in 2018 included:

- Risk assessment on the microbiological risks associated with raw pet foods
- FSA guidance on vacuum and modified atmosphere packed chilled foods
- Food and You Survey: Findings from Wave 4
- FSA Surveillance Strategy
- Changes to plant protection products maximum residue levels in relation to microbiological food safety

10. Looking to the future, the Ad Hoc Group on *Campylobacter* is expected to publish its comprehensive review in 2019, after public consultation. Similarly, the newly established group on representation of risks are working towards publishing a report in 2019.

11. I should like to thank Members of the Committee and its subgroups, without whom the ACMSF would not operate effectively, as well as the many other individuals and organisations that have helped the Committee in our work in 2018.

Professor David McDowell
Interim Chair
April 2017 to July 2019

Introduction

1. This is the twenty-seventh Annual Report of the Advisory Committee on the Microbiological Safety of Food and covers the calendar year 2018.

Chapter 1: Administrative Matters

Membership

Appointments

2. Appointments to the ACMSF are made by the FSA, after consultation with United Kingdom Health Ministers (i.e. the "Appropriate Authorities") in compliance with Paragraph 3(1) of Schedule 2 to the Food Standards Act 1999. The Agency has resolved that appointments to the ACMSF should be made in accordance with Nolan Principles[48], the guidance issued by the Office of the Commissioner for Public Appointments (OCPA)[49] and the Government Office for Science Code of Practice for Scientific Advisory Committees[50]. 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, food microbiology, food processing, food research, food retailing, commercial catering, environmental health, 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.

Re-appointments in 2018

6. The periods of appointments for Professors David McDowell and Peter McClure and Dr Dan Tucker expired on 31 March 2018. Prof McDowell was reappointed for 2 years (he would have served for 10 years at the end of this reappointment). Prof McClure and Dr Tucker were reappointed for 4 years. The reappointments are from 1 April 2018[51].

Committee and Sub-Group meetings

7. The full Committee met three times in 2018 and the meetings were chaired by Professor David McDowell.

8. The *Ad Hoc* Group on *Campylobacter* (Chair: Professor Sarah O'Brien). Members of the group worked on their report which was finalised in 2018.

9. The Working Group on Antimicrobial Resistance (Chair: Professor David McDowell) met once in 2018. Overview of the group's meeting is available at paragraph 176.

10. The Ad Hoc Group on representation of risks (Chair: Dr Gary Barker) met once in 2018.

11. The Working Group on Newly Emerging Pathogens (Chair: Dr Dan Tucker). Activity of the group during the year was carried out via correspondence.

Current membership and Declarations of Interests

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

Personal liability

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

Openness

Improving public access

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

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

15. The Committee also has an e-mail address

    acmsf@foodstandards.gsi.gov.uk

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

Open meetings

17. Following the recommendations flowing from the FSA's Review of Scientific Committees[52], the ACMSF decided that from 2003 onwards all its full Committee meetings should be held in public.

18. The plenary meetings in 2018 were held in Manchester (25 January at the Manchester Conference Centre, Sackville Street Manchester) and London (10 May at the Connaught rooms, Great Queen Street London WC2B 5DA) and 18 October at Clive House 70 Petty France Westminster London).

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

Work of the other advisory committees and cross-membership

20. The Secretariat provided Members with regular reports of the work of other Scientific Advisory Committees advising the FSA in 2018. Mrs Joy Dobbs Deputy Chair of the Social Science Research Committee is an Ex-Officio on ACMSF. David Nuttall is a member of the Social Science subgroup on the Food and You Surveys. Professor Stephen Forsythe

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

Chapter 2: The Committee's Work in 2018

First Draft of ACMSF Report on *Campylobacter* (Third report on *Campylobacter*)

21. In January the Chair of the Ad Hoc group on *Campylobacter*, presented the first draft of the Third report on *Campylobacter*[53].

22. Prof O'Brien (Chair of the group) thanked members of the *Ad Hoc* Group who had drafted the report, including several co-opted members; Dr Manisha Upadhyay and Miss Sarah Butler who helped get the draft into a fit state for presentation at the meeting; and Prof McDowell (ACMSF Interim Chair) who had created an Endnote library for the references. The focus of the report was on what had happened in the last 10 years since the Committee's last report on *Campylobacter*.

23. The following comments were made during the discussion:

- A member suggested that duck, which is traditionally served pink, should be included in the catering section. Environmental Health Officers were sometimes unsure how to advise food businesses on this practice. Members of the Group responded that pink duck had not featured in outbreak data or sporadic cases but agreed that it could be acknowledged in the report as a potential risk. One of the ACMSF members was aware of a study on pink duck that was being carried out with Public Health England and offered to feed in any relevant information that became available. It was noted that risk associated with eating pink duck (including findings of the PHE report) will be included in the report.

- A comment was made that a lot of the epidemiology chapter was represented as fact, but the number of people submitting a sample is very variable depending on whether they have access to a GP; follow up of cases is also variable across the UK, and had changed over the last 10 years from face-to-face interview to postal or telephone contact. There needed to be a *caveat* about what had changed in terms of capturing confirmed *Campylobacter* cases and the inherent bias in that, and "publication bias" because published research tends to focus on the larger outbreaks and smaller ones are not taken into account. Prof O'Brien agreed that surveillance data did not reflect disease in the population. She commented that one of the problems was that a lot of the information on follow-up was anecdotal, and she would welcome information from the member concerned, that could be quoted in the report.

- There had been a change to more sensitive laboratory testing, which may mean that in future years more cases would be detected. It may be worth mentioning this. Prof O'Brien agreed to include text in report to reflect the recent move to more sensitive laboratory testing.

- There were a number of places in the report where heat was mentioned, including recent research which might indicate an increased heat resistance in *Campylobacter* in some circumstances, but elsewhere in the report it mentions various cooking processes and that cooking for 70^{o}C for 2 minutes produces a safe product. It was important that the report did not give 2 contradictory messages: one warning of possible increased heat resistance and another saying that our usual advice of 70^{o}C for 2 minutes was safe. It was noted that the research papers quoted were more in validation of a cooking process rather than in fundamental work on D values of *Campylobacter*. A member of the *Ad Hoc* Group responded that whilst heat resistance needed further exploration there was not sufficient evidence to say that the advice of cooking for 70^{o}C for 2 minutes needed to change. It was noted that the Secretariat will liaise with the author of the chapter about putting the heat resistance text into context in the report.

- It was suggested that the data in Chapter 3 should be updated in line with the Epidemiology of Foodborne Infections Group paper (ACM/1258) that had been circulated to members. Prof O'Brien confirmed that the data had not been available when drafting the chapter, but it would be updated along with the data on raw milk.

- A member commented that it would be helpful to include a definition of DALYs and QALYs as a way of measuring illness burden.

- Chapter 7. A member pointed out that the information on raw fruit and vegetables showed there had been a 10% increase in consumption between 2007 and 2015; this was a step-change in consumer behaviour. However, the data in the report mainly pre-dated that change and the data was not from UK-based surveys. This change in behaviour should be highlighted and the Group should consider making a recommendation for further work on this.

- Chapter 9: "how new knowledge influences risk assessment". A member pointed out that from Chapter 2 it was clear that although a vast amount of whole genome sequence (WGS) data on *Campylobacter* had been collected, this did not seem to have influenced risk assessment although it was used in source attribution. He asked whether the full value of research into sequencing *Campylobacter* was being achieved, as it was not evident in chapter 9. Prof O'Brien agreed that no-one really knew how best to use WGS and although there was a lot of activity on source attribution this hadn't fed into quantitative microbiological risk assessment. A research recommendation might be needed on this (subgroup to add this as a general recommendation to chapter 9). The Chair added that the

potential of using WGS had been identified from a previous horizon scanning exercise. Dr Cook agreed that WGS had not had an impact on risk assessment yet, but it is now being used in relation to identifying other types of data e.g. AMR genes. The FSA was involved in some work at Oxford University focussing on MLST in *Campylobacter* and the sequencing would also provide information on changes on ciprofloxacin resistance in *Campylobacter* over time.

- Another member said they had found Chapter 9 difficult to read and was not sure if the title was the right one (group agreed to address query).

24. As a general comment, a member of the *Ad Hoc* Group said that this was the first time she had been involved in contributing to an ACMSF report and she had been struck by the enormous amount of work involved and the time members gave, for which they deserved more credit. She added that when the Scientific Advisory Committees were reviewed, the ACMSF was seen to be fully doing its job including the production of these reports, and there should be a way of giving more recognition to the reports and the members who had written them.

25. In conclusion, the Chair thanked members for their comments which would help the *Ad Hoc* Group in completing their work on the report.

ACMSF fixed-term task and finish group on antimicrobial resistance

26. Prof McDowell reminded members that they were informed of the proposal to establish a fixed-term task and finish group on antimicrobial resistance to consider specific issues relating to AMR in the food chain at the January 2017 plenary meeting. The group was comprised of the existing ACMSF AMR working group and additional members co-opted for their expertise. It was set up in May 2017 and met a total of five times.

27. Prof McDowell, who also chaired the group, introduced the group's report: AMR in the food chain; research questions and potential approaches[54]. He explained that in drafting the above report the group developed a food chain focussed AMR systems map taking into account a wider AMR systems map developed by Department of Health, Public Health England, Department for Environment, Food and Rural Affairs and the Veterinary Medicines Directorate in 2014. This map guided the discussions and activities of the group and identified eight main reservoirs with a potential AMR impact relevant to the FSA, which were subsequently reviewed within the group's report. As part of this review process, the group also received presentations on antibiotic usage and AMR from UK food animal production sectors poultry meat, pigs, dairy and beef cattle, sheep). The fish, gamebird and egg sectors were not formally considered by the group.

28. The eight main reservoirs of relevance to FSA research questions were identified as:
    - Pasture & Crops

- Amendments
- Food Producing Animals
- Animal Feed
- Abattoir & Carcass Processing
- Food Processing
- Human Food
- Humans

29. The Chair underlined that given the fixed term nature of this task, the group focussed on identifying research priorities of specific relevance to the FSA, rather than generating another comprehensive literature review of the expanding literature in this area.

30. Members were asked to review the report and indicate whether the key areas have been covered by the expert group so that the report can be passed to the FSA Board for consideration.

31. Although it was noted that the report was not as in-depth as the *Campylobacter* in the food chain report members commended the fixed term task and finish group for the output of their deliberations as reflected in paper ACM/1255a particularly for being able produce it in a short space of time. Specific remarks made by members in the ensuing discussions include:

32. Section on secondary food processing: drawing attention to the sections of text that specifically refer to the “considerable evidence that secondary food processing environments and activities can support, and at times encourage, the development, persistence and dissemination of AMR bacteria and genes.” This statement appears in:
    - paragraph 14, where the following sentences refer to a number of different processing steps, including cooking, it was pointed out that this may be interpreted that any of these could contribute to development, persistence and dissemination of AMR bacteria and genes;
    - paragraph 65, where following paragraphs describe various forms of secondary processing activities, also including cooking.
    - There is no detail provided of the “considerable evidence”. This should be included, to help support the statement. Fixed-Term T&F Group to include in its report (cite studies) that contribute to this considerable evidence mentioned in paragraph 65 of its report.

33. Amongst the studies constituting this “considerable evidence”, it would be anticipated that there may be specific secondary food processing activities that are shown to be more likely to lead to development, persistence and dissemination of AMR bacteria and genes. In paragraph 75, it is recommended that the FSA should commission research on “the impact of currently used sub-lethal food processing technologies….”. This was queried as it was pointed out that in theory, this could include a large number of processes. The Fixed-Term T&F Group agreed to consider appropriate terminology (e.g. define what is meant by “sub-lethal” – sub-lethal to what?) and how the various activities referred to are prioritised. The member who raised this said, it is important to bear in mind here that most processes implementing “bacteriostatic activity” will have a control step in place for destroying infectious vegetative pathogens such as *Salmonella*, that have a low infectious dose. The bacteriostatic activity is usually targeting sporeformers and/or spoilage organisms, where there are critical levels required before safety or spoilage become a concern. The report refers to situations where the bacteriostatic stresses are reduced or removed, but if this occurs, then foods would spoil or become a safety concern.

34. Paragraph 73 referred to the observation that it is becoming increasingly clear that sublethal stresses trigger defence/repair mechanisms and that in foods stored or processed under inadequate bacteriostatic conditions, sublethally damaged populations constitute hotspots in development and dissemination of AMR. The Poole ref cited (Poole, 2012) as evidence for sublethal stresses triggering defence/repair mechanisms also considered whether these stresses are likely to lead to AMR development. Fixed-Term T&F Group agreed to consider appropriate material in the cited paper that could be reflected in the report.

35. It was suggested that the Amachawadi *et al* (2015) paper refers specifically to use of heavy metals in animal feeds and this could also be mentioned.

36. An editing point drawn to the Interim Chair’s attention was where the paper mentioned there was considerable evidence that secondary process can support AMR (paragraph 14) but later on in section (paragraph 23) stated that there’s a considerable lack of data in relation to AMR in UK produced and imported foods. The Chair explained that there was a lot of information relating to problems of slow growth and stress and its effects, but majority of this was in clinical terms and health service activities but very little in terms of food processing activities. Although it was underlined that there was evidence in principle group indicated that it did not look at evidence from food. Group agreed to resolve the apparent dichotomy in its paper.

37. A couple of the sentences in the animal feed section appear to be contradictory. Para 36, it says “The sources of such AMR pathogens can

be multiple, but animal feed has been identified as an important reservoir". However, in para 37, it says, "There is a paucity of information regarding AMR in animal feed (residues and resistance in bacteria". Fixed-Term T&F Group to address this inconsistency.

38. A member commented that the terms of reference mentioned that reducing the uncertainty relating to linkage between various animal and human pathways and AMR was not as simple as breaking up into 8 reservoirs and addressing uncertainty in each of these as this does not necessarily control uncertainty as a whole. The Chair explained that the intention was that the group looked at food focusses rather than complicated/non-complicated maps and the group took a conscious decision to prune out some of the complexity to focus on things that were of importance to the FSA within the timescale they were given. It was pointed out that the food area is hampered by lack of data meaning that some of these gaps need filling before we can look at the issue in broader terms.

39. In relation to the above point a member suggested including a bullet point in the "general conclusions and overarching themes identified by group" emphasising the overall complexity of AMR as it interlinks with other areas not directly linked to the food chain**.** Dr Cook (ACMSF Scientific Secretary) mentioned that the diagram illustrates the interconnection between AMR reservoirs and that what the group's paper is seeking to do is to see where the food chain fits into this to focus attention on AMR gap that need to be filled in relation to food. Fixed-Term T&F agreed to include a bullet in overarching themes section to capture the overall complexity of AMR and where food fits in.

40. General observations made on AMR in the food chain include: the FSA has started to address the issue of AMR data gap (one of its surveys that looked at AMR in retail meat, will be published in Spring 2018); recent data from industry is showing a dramatic reduction in the amount of antibiotics used in the livestock industry and sectors in the livestock industry have antibiotics stewardship programmes. It was expressed by the ACMSF Scientific Secretary that the expectation from the fixed-term task and finish group is for members to identify areas that would help plug data gaps in relation to the food chain. This would help in understanding the relationship between usage and the consequence in terms of contamination of food with AMR bacteria.

41. In conclusion Prof McDowell thanked the fixed-term task and finish group (particularly the co-opted members) for their hard work and dedication in being able to produce a robust report for the FSA to consider. The Chair indicated to members that once the suggested amendments have been reflected on the paper and finalised it will be passed to the FSA Board for consideration.

Assessment of whether the microbiological risk associated with consumption of raw drinking milk (and certain raw milk products) made in the UK has changed since 2015

42. Dr Paul Cook introduced the above paper[55] explaining that this was an interim assessment of whether the microbiological risk from consumption of raw drinking milk (RDM) and certain products, made in the UK, had changed since 2015. In July 2015, following a policy review, the FSA Board had agreed with recommendations to continue with existing controls governing the sale of RDM. The paper reported that in the last 12-18 months there had been a notable increase in the producers of RDM and also a small but notable number of outbreaks associated with it.

43. Dr Cook explained that the FSA Board had asked for further information on the microbiological evidence, economic information about the market sector, social science aspects on the types of products and perceptions on RDM, to inform further discussions they would be having on this subject in March 2018. The FSA's Microbiological Risk Assessment Branch had gathered information, contained in the paper, on consumption of RDM and certain products made from it, focussing on newly registered producers to see if they may be more likely to produce unsafe products than more established producers, whether there has been a change in the profile of vulnerable groups becoming ill and whether there have been any changes in the pathogens involved in infections associated with drinking RDM. Dr Cook emphasised that this was still work in progress and there would be further information still being gathered, which would be incorporated into the paper in due course. He summarised the main points in the paper and asked Members for their views on the key issues and whether they could suggest any other types of data analysis that might help with the assessment.

44. Members welcomed the paper and made the following comments.

45. The paper would benefit from a concise summary to include the most important points. Suggestions for points that should be highlighted were:

    - There has been an increase in sales and a 10-fold increase in the volume produced, so there has been an increase in exposure, including vulnerable consumers, especially children. The majority of outbreaks involve children, some under the age of 5. This needs to come out more strongly in the paper.

    - The hygiene ratings are not a good indicator of the safety of the milk. It would be helpful to know the hygiene rating of premises at the time of outbreaks. One of the outbreaks was in Wales where from the outbreak control team it was learned that the premises had the highest level of hygiene rating and this had given cases a false sense of security because they interpreted it as an indication of the safety of the raw milk that was being consumed rather than about the cleanliness of the premises.

- There have been 10 incidents of actual or potential cause of harm to humans in the last year alone – this is a sea change.

- In the section on vending machines and internet sales, another uncontrolled, unregulated step that could be highlighted was the additional time delay in getting the milk to the producer. It would be helpful to have a comment about how long bacterial survival of *Campylobacter*, *E. coli* O157 or STECs and *Salmonella* in milk in order to understand the implications of the data.

- 59% of milk samples were satisfactory, but that leaves 41% *not* satisfactory and 1% of those were known to be harmful. The emphasis should be on the latter 2 figures.

46. Members were not surprised that the increase in sales and consumption has led to increased outbreaks. Is there anything else that has happened in the last few years from a processing perspective that has led to an increased risk of contamination?

47. Several members commented on the dis-connect between routine process hygiene monitoring and the consequences that were being seen. Testing does not provide the relevant information. It was mentioned that in the report of an outbreak in the US in 2014, inspectors went into the premises during the outbreak and found nothing, gave the certificate back to the producer to re-start manufacturing, but the outbreak continued. Is the routine sampling being done at the right point in time relative to point of sale? What is the shelf life of products and is there lack of regulation on this? Has there been a change in the dairy hygiene inspection visits? Are the things considered in the inspection process the correct ones? Were there any other risk markers that may be associated with these outbreaks other than the microbiological sampling? Dr Cook confirmed that further information had been sought from the Dairy Hygiene Inspectors.

48. A member commented that a typical small dairy would produce about 100,000 litres a year whereas the biggest dairies would produce several hundred, million litres. One of the safety factors for small scale dairies is pooling: the more milk you mix the less likely it is to have significant contamination, so one area of data collection would be to ask what is the size of the bulk tank, because the pooling factor from the tank might be a significant piece of information.

49. One of the changes that was missing in the paper was the mention of the increase of the overt promotion of raw milk advocating the health benefits of consumption. A member commented that the under-5's don't buy milk: their parents do. They may think there are health benefits, but if it was labelled "this may contain poo" they might think differently! The cleanliness of the dairy is not the point, it is the actual raw milk that is the issue. If you are buying it as a health product, to help your child, when you find out how contaminated it is, most people would not take that risk.

50. Members agreed that there was a need to do some sort of social study to understand why some people choose to drink raw drinking milk. The Food and You study may be including raw milk as a new category, but there needs to be more focussed work among people who *are* drinking it. In terms of what the Board is going to do, should they be taking a stronger line than they have in the past? A member had found a piece in The Telegraph which stated that "there have been no reported outbreaks since 2002". He stressed that the FSA needed to publicise the true picture.

51. A member asked about labelling of raw milk products in terms of shelf life and whether it was safe to freeze and was informed that the FSA was consulting on possible changes to the wording of the health warning on labels. Members recognised that even if the labelling is clear, there is a consumer group who is making a lifestyle choice and there needs to be a way of communicating the risk to these groups using different kinds of messaging rather than the standard advice given in the past. However, it was also pointed out that raw milk may be drunk by a range of people, including people who encountered it at shows who would not normally have chosen to drink it if they had been given more information. Another group to be considered were immune-suppressed patients who in the past may have been given special diets. As most of the foods produced in this country are now deemed to be safe for these patients, this may need to be looked at again.

52. A member asked how many of the producers quoted in the Willis paper were new producers. Dr Cook did not readily have an answer but agreed to follow this up. It was pointed out that a lot of the data doesn't get reported to PHE, so the data might be skewed.

53. Looking at issue in one dimension it could be said that the risk is the same but the exposure has changed, but looked at using a matrix in 2 dimensions, e.g. comparing frequency with severity, there would clearly be a difference between 2017 and 2014.

54. In summing up the discussion, the Chair said that it was noted that there have been qualitative and quantitative changes in the system. It was hoped that members' suggestions would be of use in the next stages of the paper. He commented that this was an example of where the committee could feed in useful comments when it is consulted at an appropriately early stage.

55. Dr Cook thanked members for their useful suggestions. He indicated that the paper would be developed further and brought back to members for further consideration.

56. The Committee considered a revised risk assessment at the plenary meeting held in May 2018. Members noted that comments made in January had been incorporated into circulated revised paper. Prior to the meeting a teleconference was held with a few members to discuss the

January comments. Dr Jo Edge (FSA Microbiological Risk Assessment) introduced the revised paper[56].

57. Dr Edge explained that additional information had been added on outbreaks, from PHE, and additional surveillance data from statutory monitoring of RDM, information from Dairy Hygiene Inspectors and testing from Food Business Operators, consumer research and whether the additional of sugar might affect the level of risk. A conclusion and Annex had also been added. She asked members to comment, focusing on the data, the conclusions, and the proposed risk classification in the conclusion and the text in section 7. The following points were made in the ensuing discussion:

58. It was suggested that everybody who collects data, reports what the actual pooling volume of the milk sampled was. If a large volume of milk is pooled from multiple sources what you would expect to see would be different when compared to a small volume, from just a few animals. It is crucial to clarify the variance of the sampling to understand if the results are statistically significant.

59. Table 2 showed that for 2016 and 2017 – there were 2 and 4 outbreaks respectively. It was queried whether these are anomaly years or part of a trend? Whilst there have been more outbreaks reported it was not possible to identify a trend from 2 points but it is reasonable to point out that we have seen 6 outbreaks in 2 years whereas there had been no outbreaks in several years previously. The situation would have to be revisited, probably annually.

60. As the risk assessment was predicated on the prevalence of pathogens in RDM, the statement that "1% of RDM servings are potentially harmful" was queried as it was not clear if this meant per serving, or per 25ml. Dr Edge confirmed that her understanding was that the survey data from PHE was based on 25ml samples, not servings: this would be clarified in the text.

61. It would be helpful for the future to have information on what had been done to rectify the situation when a farm fails statutory testing, to find out what actions were useful in reducing further failures and what actions had no effect.

62. Was it time to look at a quantitative assessment? Dr Edge said that the information needed had not been recorded routinely until the middle of last year but it should become possible in the future to use more numerical data.

63. The information PHE gathers doesn't cover other vulnerable population groups like pregnant women. They were only able to provide a breakdown of the data for children but not for other vulnerable groups.

64. It is not just the number of outbreaks but the severity that needs to be considered. Some of the consequences are very severe, including STEC.

65. Not all cases of *Campylobacter* are followed up routinely by local authorities, so there will be under-reporting. Campylobacteriosis is not a

trivial illness. If the data shows 2 outbreaks that is probably the tip of the iceberg. We do not know how many sporadic cases underpin the outbreaks, or how many other outbreaks there are with other aetiologies that don't get reported.

66. Members recognised there was an emerging problem. If raw milk was regarded as a higher risk product it should have a higher level of testing, so it should be stressed that if all raw milk producers new or old, were involved in a standardised sampling system there would be more information on which to base future risk assessments. Dr Edge responded that the risk managers and the Dairy Hygiene Inspectors accept that there are gaps in the sampling. At the moment the DHIs conduct quarterly testing for indicator organisms but have realised that more needs to be done and will be introducing testing for the FBOs to do themselves, and to strengthen the testing done by the DHIs to include pathogen testing as well as indicator organisms.

67. After discussion, Members agreed that they would like the risk classification for the population drinking raw milk to be amended to "medium". They also agreed that the risk for raw milk products should also be regarded as "medium" but with a higher level of uncertainty.

68. Dr Edge expressed thanks to the committee for their comments and Dr Cook indicated that once the Committee's comments on specific points had been addressed, and the risk classification amended it would be helpful to upload a revised version to the ACMSF website for others to see, in advance of the FSA Board discussion in June 2018. Members were content with this.

Shiga-toxin producing *E. coli* (STEC) in food

69. Dr Manisha Upadhyay introduced paper ACM/1281[57]. Members had also been provided with 3 annexes which were restricted to ACMSF members use only. The cover paper reminded members of the background to the committee's last consideration of STEC in June 2015 when they had commented on draft EC Guidance on STEC in ready-to-eat foods and responded to 3 specific questions arising from that guidance. Following this, the FSA has produced a draft working policy guidance document for use in dealing with foods contaminated with STEC. Dr Upadhyay outlined the content of Annex A which considered markers of pathogenicity and virulence in STEC, occurrence of STEC in food, and outbreaks, with a view to identifying any changes that had taken place since 2015.

70. Having highlighting some of the main points in Annex A, Dr Upadhyay asked members to comment on the information in Annex A, to decide if they wanted to change the responses to the 3 questions (a-c) from their 2015 discussion, and to review the general approach used by the FSA in dealing with foods contaminated with STEC and indicate whether this still remains appropriate or whether any improvements could be made.

71. The following comments were made:

- The paper was very well written and clear.

- A member pointed out that the large amount of literature on the subject challenged current thinking about how to assess risk from pathogens. It is impossible to take the information as it stands and do enough risk assessments to satisfy all the decisions that have to be made. It was very clear from the paper that counting additional virulence factors was not going to solve the problem. The existing way of looking at the combination of a particular pathogen and a particular vehicle to work out the potential impact and frequency for the population is difficult to do with this level of information. Looking at the gene content of a whole sequence might not be the way forward, there might be another way.

- A member drew attention to two additional papers he was aware of that were relevant: Lupolowa *et al*[1] and Annemarie Pielaat *et al*[2].

- With the move to PCR testing it was becoming necessary to move from a very simple set of actions to a more risk-based approach particularly because of the time lag between getting the initial results and the more detailed genetic results from the Reference Lab, which may take 4 weeks. This is similar for human samples.

- PCR testing for STEC genes in food can be done as a routine test using commercially available kits. There are only 11 UKAS accredited labs able to do STEC testing, 3 of which are PHE. If the ISO specified method is followed then results are available from broth fairly quickly, but the isolation step takes much longer.

- It is not routine in the food industry to do all the tests in one go. The enrichment assay is routine, but the tools are available to investigate further if something is found. Because of the time delay it is normal industry practice to act on the presence of a confirmed isolated STEC rather than looking at the virulence factors.

- Public health guidance on STEC management in humans has been published by PHE which has direct parallels i.e. there are a lot of uncertainties and additive factors.

72. Members discussed question a) and the statement made by the Committee previously, and concluded that for the following reasons they were not in a position to change the statement yet:

    - there are so many uncertainties about *stx*-1
    - STECs cause serious illness,
    - the infective dose is very low,

[1] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5056084/
[2] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4613885/

- there was a need to take a precautionary approach with ready-to-eat foods
- the recent FAO/WHO report (2018) stated all STEC strains should be regarded as potentially pathogenic. Host susceptibility and bacterial genetic background are important in determining pathogenicity of STEC strains.

73. Members agreed that the statement in the FAO/WHO report may not be true for ever but that there was not enough information at present to suggest a change in their opinion.

74. Regarding the second sentence "It was recognised that not all STEC strains are pathogenic . . ." a member commented that there is clearly evidence that some serotypes don't cause illness, even with certain *stx* genes, if they lack the adhesion genes, so it is difficult to conclude whether they are all pathogenic or not. However, the overall view of the Committee was that given all STEC strains have the potential to be diarrheagenic the second sentence in the answer to question a.) should be removed.

75. Regarding Question b.), the following comments were made:

- the thinking has moved on in the last 3 years and serogroups are much less important in risk assessments. The list given in the question was not exhaustive.
- the list was not just growing but disaggregating and so increasing at speed and will continue to grow over time. There were also other serogroups that had become important in human infections recently e.g. O55.
- the text: "strains most likely to cause severe illness" could be changed to "the presence of pathogenic STEC strains".
- The phrase "strains most likely to cause severe illness" seemed to be linked in the paper to shiga-toxin producing strains possessing various attachment factors. There was a concern about the term "severe illness". If they don't have certain attachment factors, they may still cause illness. The Committee's role was to consider illness, not just severe illness.
- There was agreement that highlighting certain serogroups was irrelevant. Members agreed that there was not a significant risk from STEC in a non-RTE food as long as the food was handled and cooked appropriately. The current controls seem to be reducing the burden of STEC in foods that will be processed (e.g. cooked) and it would be onerous to go beyond that. The severity of disease from both *Listeria monocytogenes* and STEC was high in susceptible groups. It was important to avoid making a decision that had consequences for other pathogens.
- Although the list of serogroups had been compiled from those associated with large outbreaks, it was time-limited and there would be others. Members agreed it would be preferable to refer to "pathogenic strains, including those with known adhesion factors and known aggregative factors." It was agreed that the statement "Serogroups are

not of much significance here" should be added to the answer to question b.) It was acknowledged that strains within the same serogroup can have different virulence properties as virulence genes reside on mobile genetic elements.

76. Regarding question c.) in clarifying the question, a member explained that the first stage in the reference method is to put the food into an enrichment broth for 24 hours and then test the broth for the presence of *stx*. However, if there was a positive result it was still not possible to say where the *stx* was coming from; it could be from an *E. coli* but may not be. Members agreed that the answer to question c.) did not need to change.

FSA's guidance on vacuum and modified atmosphere packed chilled foods

77. At the May plenary meeting the Chair updated the Committee on the joint statement he and the FSA Chief Scientific Adviser issued on the FSA's guidance on vacuum and modified atmosphere packed chilled foods. He reported that the statement was as a result of the discussions the FSA and Food Standard Scotland had with the meat industry over meat hygiene compliance concerns. The Chair explained that industry has queried the FSA's current guidance on vacuum and modified atmosphere packed chilled foods. Industry representatives that attended the meeting challenged the statement on grounds that when the proposal to amend the above guidance was published industry responded to the consultation with detailed comments and a lot of information on studies and risk assessments that have been carried out by industry, but these were not acknowledged by the FSA. Industry also rejected the notion that new evidence was unavailable on the issue of vacuum and modified packed chilled foods.

78. As the guidance is based on the Committee's report on vacuum packaging and associated processes and other scientific material from industry, members were informed that the Committee will be asked in due course to consider new evidence on this subject when this is available.

79. Although it was mentioned that Professor Mike Peck of the Quadram Institute and his team were working on a project in this area, a member indicated that he was aware of relevant new evidence on this subject. Following discussion on the availability of new evidence and on the question of at what point should the Committee refresh the scientific reports it publishes, the Interim Chair asked the secretariat to seek from literature new material in the last 10 years and obtain relevant information from the ongoing work and report back to the Committee.

80. At the October plenary meeting Dr Paul Cook provided an overview of published studies that have been carried out on the issue of vacuum and modified atmosphere packed chilled foods with respect to *Clostridium*

botulinum in the last 10 years[58]. He reported that the aim of the paper was to assist members in deciding whether it was timely to revisit the scientific evidence base concerning *Clostridium botulinum* and vacuum and modified atmosphere packaged foods as this underpins the FSA's guidance.

81. Regarding the peer reviewed literature Dr Cook highlighted that the literature searches were undertaken covering the 10-year period 01/01/2008-11/10/2018 using the database PubMed coupled with some additional checking using Google Scholar. He underlined that the literature in this area was not large and not all of it concerns food although the search terms (MeSH – Medical Subject Heading) were kept broad to ensure good coverage of the topic and to avoid missing pertinent literature. The key areas of work relevant to *Clostridium botulinum* and food were covered under the headings of taxonomy and genomics, detection methods, growth and survival studies, heat and high-pressure processing, studies on specific foods, other *Clostridium* species and risk assessment.

82. Other areas covered in Dr Cook's paper were guidelines and research reports and recent studies concerning raw meat. Under guidelines and research reports the publications highlighted include: guidance on considerations in relation to non-proteolytic and proteolytic *C. botulinum* and cheese published by the Specialist Cheesemakers Association, Leatherhead Food Research white paper on controlling *Clostridium botulinum*: using challenge testing to create safe chilled foods (published in 2017), guidance on the important factors to consider when determining the shelf-life of chilled foods with respect to non-proteolytic *C.botulinum (*produced by Quadram Institute Bioscience, Leatherhead Food Research, British Retail Consortium, Chilled Food Association, Meat Science Australia) published in 2018, Campden BRI second edition of their code of practice for the manufacture of vacuum and modified atmosphere packaged chilled foods published in 2009, Food Safety Authority of Ireland's guidance (published in 2017) and the SUSSLE Process/Shelf Life (an outcome from the recently completed LINK project SUSSLE - Enhancing sustainability of chilled prepared foods.

83. Recent studies involved work undertaken by Campden BRI and QIB Extra (a subsidiary of Quadram Institute BioScience) for the meat industry to look at the potential for growth and toxin production by *Clostridium botulinum* on raw meats (beef, lamb and pork). The literature review found little evidence of published work in this area over the past 10 years.

84. Members were invited to:
    a) comment on this summary of published information and current studies relevant to the issue of *Clostridium botulinum* and vacuum and modified atmosphere packaged foods and;

    b) consider whether it would be timely for the committee to revisit the scientific evidence base in this area by establishing an ad hoc work group.

85. Before the Committee members discussed the above paper, the following members declared their interest on this subject: Gary Barker was involved in the work cited in paragraph 18 of ACM/1282 as an employee of IFR now QIB when the study (an extensive literature review to assess non-proteolytic *Clostridium botulinum* spore populations in groups of food which are typically used as components of chilled minimally processed foods in the UK) was carried out, Peter McClure stated that he was involved in the SUSSLE project when he was an employee of Unilever, Roy Betts declared that his employer Campden BRI provide industry with advice on this subject and Alec Kyriakides added that his employer Sainsburys fund work on this topic with Campden BRI and other related groups. Gary Barker pointed out that paragraph 18 should include a sentence to clarify that the study included experiments with real food material.

86. While welcoming the paper a member pointed out that what was missing in it was information on epidemiology and outbreaks (data on cases) that may have been recorded in recent years although he underlined that he was unaware of any outbreaks of non-proteolytic *Clostridium botulinum* associated with properly chilled food. He explained that this was relevant in the context of deciding whether to revisit current risk assessment. It was added that if there has been no outbreaks or cases associated with this pathogen this may suggest that the controls are mitigating against the possibility of cases.

87. In relation to the above comment a member stated that if outbreaks of non-proteolytic *Clostridium botulinum* associated with properly chilled food are investigated consideration should also be given to exposure on food not properly chilled that would support growth of the organism and try and estimate the exposure data because there have been changes in the volume of chilled foods in recent years. His suggestion was to focus on those foods susceptible to non-proteolytic *Clostridium botulinum.*

88. Highlighting the severity of botulism poisoning and the rarity of cases a member flagged that there might be merit in testing the 2-dimensional risk assessment on any available data.

89. A member questioned how the debate on getting rid of plastic in food packaging will affect food safety as plastic is mostly used in packaging for chilled foods. She questioned if there was a suitable replacement for plastic packaging in relation to chilled foods.

90. The Interim Chair noted that the review was instructive and had filled some information gaps. He suggested several areas for the FSA to put on its watch list. These include:

    - Dahlsten *et al*. (2015) study that highlighted a lack of data on genetic, stress-related mechanisms of non-proteolytic *C. botulinum* and a need to understand the effects of successive processing treatments on

subsequent behaviour when subjected to further processing (paragraph 19 ACM/1282).

- Studies on the effect sodium nitrite and sodium nitrate on growth and toxin production by non-proteolytic *Clostridium botulinum*. He highlighted that the FSA might want to observe developments in this area.

- Ongoing risk assessment work: whenever data becomes available the FSA advised to consider sharing these with interested parties.

91. On the specific questions to the Committee, members welcomed the summary of published information and current studies relevant to the issue of *Clostridium botulinum* and vacuum and modified atmosphere packaged foods. Members agreed to review the evidence from the ongoing studies once they are available (studies expected to be completed early in 2019). It was added that the findings from these studies will determine whether to establish an *ad hoc* group to review the current FSA guidance. The Secretariat agreed to provide an update on the ongoing studies at a future meeting.

Microbiological risks associated with raw pet food

92. In May the Committee was asked to consider a paper on microbiological risks associated with raw pet food to comment on the risks to humans associated with the use of raw pet food[59]. The Interim Chair invited Dr Manisha Upadhyay to introduce the scene-setting section and Dr Mark Bond (FSA Food Policy: Animal Feed and by-products branch) to present the issues set out in the paper.

93. Dr Upadhyay reported that feeding of raw meat-based diets (RMBDs) to pets has become an increasingly popular trend amongst pet owners and has largely been driven by a movement towards consumption of more raw food by humans. She explained that the perception amongst certain pet owners is that such diets may be beneficial for their companion animals. However, the literature highlights significant concerns that such practices pose a health risk for both pets and their owners, as RMBDs may be contaminated with a wide range of pathogens including *Campylobacter* spp. *E. coli*, *Yersinia* spp., *Salmonella* spp., *Listeria* spp., *Clostridium* spp. and also zoonotic parasites, many capable of causing enteritis and serious illness not only in humans but also in companion animals.

94. It was underlined that while raw pet food is not considered directly to be a food safety issue, it can nonetheless be a potential source of zoonotic infection via unhygienic or inappropriate handling in a domestic kitchen environment through cross-contamination of food.

95. Dr Upadhyay highlighted that in addition to the potential to cause human illness, raw pet food also may have the potential to increase animal and human exposure to AMR bacteria. The ACMSF fixed-term task and finish group on AMR recommended that further research is required on the prevalence of pathogens in companion animal feed and their contribution to human AMR.

96. Dr Bond in his presentation covered background information on the raw pet food industry, FSA incidents on raw pet food, typical composition of raw pet foods, microbiological profiles of raw pet food antimicrobial resistant bacteria and raw pet foods, commonly identified risks to pets from raw pet food, incidents of morbidity or mortality in pets associated with raw pet food, risks of raw pet food to humans, incidents of morbidity in humans associated with raw pet food and risk recommendations.

97. The Committee noted the number of raw pet food incidents from 2013 to date (up to quarter 1 figures for 2018). This data included domestic incidents as well as EU traded goods (i.e. imports into the UK and exports from UK producers). With the raw pet food comprising <5% of the total pet food sector in the UK, the cases reported represent a disproportionately high frequency of incidents for raw pet food. In line with observations from the academic literature, *Salmonella* contamination in raw pet food has generally been the source of incident notifications; although other recognised pathogens have also been reported to the FSA (i.e. *Listeria, Brucella suis* and Shiga-toxin producing *Escherichia coli* - STEC).

98. On risks of raw pet food to humans it was reported that *Salmonella* and *Listeria* can cause severe and potentially fatal infection in both the animals consuming the pet food, and the humans that handle the pet food. It was explained that there is a risk to humans from handling contaminated pet food products, especially if they have not thoroughly washed their hands after having contact with the products or any surface exposed to these products. Pets can be carriers of the bacteria and infect humans, even if the pets do not appear to be ill.

99. From the wider literature, Members were informed that there were incidents of morbidity in humans associated with raw pet food. An illustration was a case (in February 2018 reported by the FDA) of two children in a single household in the USA becoming ill with *Salmonella* Reading; the same serovar was identified in the raw pet food fed to their dog. One child's illness resulted in septicaemia (blood infection) and osteomyelitis, a painful and serious bone infection.

100. Dr Bond outlined the risk recommendations/advice for raw pet food issued by the US FDA, the US Centers for Disease Control and Prevention (which does not recommend feeding raw diets to pets), the Canadian Veterinary Medical Association and the UK Pet Food Manufacturers Association (who has published a consumer advice factsheet specifically on feeding raw pet food) and the UK national charity, Pets as Therapy (PAT) who issued a

statement in early 2018 urging volunteers not to feed raw meat-based diets to their therapy dogs; which often attend hospital/clinical and school environments, due to the potential of spreading disease especially to vulnerable groups.

101. The Committee was asked:

- To consider the information in the scene-setting paper and;
- To provide the FSA with any comments or recommendations in relation to microbiological risks to human health.

102. The following comments were made by members during the discussion.

103. A member referred to a large outbreak of *Salmonella* in Canada related to raw pet food, the multi-country outbreak of *Salmonella* Enteritidis (PT8 infection) associated with the handling of feeder mice and the cases of hedgehogs spreading *Salmonella* to humans emphasising that risk of *Salmonella* infection was high when pathogens are brought into the home and has a permanent presence. It was acknowledged that although proper hygiene minimizes the risk of infections from bugs in the home, the fewer pathogens that are brought into the home the better.

104. Cooking of raw pet food as suggested in some of the available advice/guidance was agreed would not make a difference.

105. It was recognised that the subject of feeding pets with raw food was a lifestyle choice (similar to the preference for unpasteurised milk) and an emotional issue which may need consideration from a social science perspective as there may be barriers or resistance to change regardless of advice provided by industry or health professionals.

106. It was noted that material that goes into raw pet foods products are from animals that had been passed by food inspectors to be fit for human consumption. They could possibly become a source of infection if handling/preservation standards fell when these ingredients are diverted from the food chain into the pet food chain (becoming animal by-products).

107. Although it was acknowledged that ACMSF has an interest in cross contamination in the domestic setting, it was pointed out that as ACAF (Advisory Committee on Animal Feedingstuffs) was also looking at issues relating to raw pet food the Committee should be mindful of straying into ACAF's territory.

108. A member while underlining that raw pet foods was clearly a risk to animals welcomed ACAF's role in tackling the issues however he could not see the potential risk it posed to the public as it was accepted that the public were already handling raw meat/raw poultry. He added that because these products are well packaged before they are used he could not see how they presented increased risk to the public/consumers.

109. There was discussion on the possible cross-contamination by contaminated pet food brought into the home of food for human consumption as both could be stored (frozen or refrigerated) in the same location. It was agreed that cross-contamination presented a real issue for domestic food handlers and home-based catering businesses as permanent presence of pathogens in the home presents increased risk of infection. Members accepted that pets (such as dogs and cats) after consuming food contaminated with pathogens and playing in close contact with children may constitute an increased risk especially as the pathogens won't be contained or restricted to a spot.

110. A member highlighted that the advice by health agencies to cook raw pet food was contradictory as it goes against the product manufacturers instructions. Members noted that the advice to cook products were mainly from the United States as mitigation against infection as the products are legitimate products that cannot be banned.

111. A member referring to an FSA study on domestic kitchen practices (published in July 2013) felt that as raw pet foods were legal products, there was merit for government to make guidance available for those who wish to use this material covering areas such as best way to handle, best way to prepare and present products for consumption, best way to clean and disinfect utensils that have been used for preparing the food explaining that these were important to prevent cross-contamination.

112. Reference was made to gastro-intestinal attribution studies in relation to domestic animals with the suggestion that it would be interesting to know the contribution of raw pet foods to GI infections in the home.

113. The issue of encouraging vets to be advising pet owners on the potential risks of raw pet foods was flagged. It was recognised that as the use of raw pet food was a lifestyle choice there may be resistance to any advice.

114. It was observed that some of the contaminated products mentioned in the paper (which may be a mixture of pork, lamb, beef or poultry) may not have been tested for all potential pathogens. Products from third country sources may not have been tested for pathogens not found in the EU. The antibiotic resistance issues flagged in the paper were noted. It was mentioned that some of the antibiotic-resistant organisms highlighted have not been found in the UK livestock sector.

115. As microbiological results for raw pet food in an US FDA study and Utrecht University study (highlighted in paper ACM/1270) revealed significant number of listeriosis isolates, a member asked if PHE's enhanced surveillance covering listeriosis was picking up cases linked to raw pet food. It was suggested that PHE could be asked to include raw pet food in the scope of its enhanced surveillance of listeriosis cases.

116. A member raised the omission of feeder mice in the discussion paper emphasising that because of the recent outbreaks associated with handling of feeder mice together with the variety of issues relating to the ongoing cases it should have been referenced in the risk assessment. Dr

Bond explained why feeder mice was not discussed in paper. He informed the Committee that there were ongoing deliberations with the European Commission, PHE, APHA/Defra and FSA/ACAF on how to tackle its distinct issues.

117. As it was recognised that other government groups were discussing safety issues relating to raw pet food and feeder mice it was suggested to include mitigation of risk to humans in the advice/guidance that these groups will publish.

118. ACMSF was reassured that ACAF was involved in tackling the issues of concern relating to raw pet food and feeder mice and agreed that ACAF not ACMSF should be the lead Scientific Advisory Committee advising the FSA on this matter. However, ACMSF had no objection to working with ACAF and was happy to receive updates on developments on raw pet food.

119. A member corrected the worth of the pet food industry as indicated in the paper from £2.7bn to £52m. Dr Bond subsequently provided a corrigendum stating: Latest figures collated by the Pet Food Manufacturers Association indicate that the size of the UK raw pet food market has grown significantly over recent years and is now estimated to be in excess of £100m annually, within a total pet food market of £2.8bn per annum.

120. Dr Bond welcomed ACMSF's comments on the risk assessment and the Committee's position that issues were more appropriate for ACAF in accordance with their remit.

FSA Surveillance Strategy

121. The FSA's surveillance strategy was briefly covered in the Epidemiology of Foodborne Infections Group update members received at the May plenary meeting. Members welcomed the suggestion to be briefed on this.

122. At the October plenary meeting, Dr Jesus Alvarez-Pinera FSA, Strategic Surveillance Team, Science, Evidence and Research Division gave a presentation on the FSA's strategic surveillance, giving an overview of current and future work focussing on EU exit[60]. He explained that the aim was not to replace regular surveillance activities, but to build additional capability to identify risk in a predictive way by making better use of open data. Work is being undertaken on several work packages which are completed in 7-10 weeks, starting with defining the business question by talking to business experts, the food crime unit, the imports/exports team and risk assessors, collating the data, then working with data scientists and business stakeholders to work on a prototype and finally finding a technical solution.

123. Dr Alvarez-Pinera gave a summary of two areas of work the team had undertaken: predicting the risk of Vibrio infection in the UK; and developing a better understanding of olive oil adulteration. An HMRC trade visualisation tool had been developed and an example was given which

showed trade with Third Countries, the volume and price of commodities traded over time, and the UK port of entry. It was found that data collected for one task is often transferable to others and over time a "toolbox" of transferable models and common datasets would be created.

124. Dr Alvarez-Pinera outlined a completed piece of work on EU exit where information was lacking on how food travels across borders from EU countries. A "hackathon" stage identified the need to focus on risk by looking at the hazards for particular commodities, secondly the need to identify where the food was coming from, and thirdly the route of entry into the UK. After EU exit this information would be needed by the FSA imports team so that a predictive model can aid the allocation of resources to carry out official control samples at ports.

125. After giving further detail of how the predictive models worked, Dr Alvarez-Pinera summarised the future and current work of the surveillance team. This included understanding how the financial strength of food business operators related to regulatory compliance, and how to use data to identify shortages and surplus in the supply chain (for example, pork mass balance).

126. Following the presentation, members raised the following points.

- In answer to a question on whether we would still have access to RASFF and GRAIL after EU exit Dr Alvarez-Pinera replied that we would still be able to access data from the RASFF public-facing portal but some of the information would not be available, and similarly with GRAIL/TRACES. Work was on-going to replace these databases but it was unclear as yet how this would work.

- A member pointed out that the surveillance strategy was based on open data which could be regarded as "trusted data" but there was a large amount of information that the owners did not want to disclose. The member asked if there were any plans to move away from open data into a blockchain system. Dr Alvarez-Pinera replied that some pilot work on blockchain had been carried out, which would be an advantage if it can be rolled out quickly enough. Open data was being used because it was easy to access but the team was finding that by combining open datasets can provide something that is sensitive. There may also be the need to move to buying data.

- A member pointed out that modelling for aflatoxin alerts, was very different to modelling for the presence of aflatoxin. Dr Alvarez-Pinera agreed that this was an important distinction because some of the alerts cannot be explained. He said that his team was working with colleagues to improve the model to predict aflatoxin presence, not just the alerts. Another member added that when building systems they can either be very precise but will miss things that need to be spotted, or if the system records everything there will be a lot of false positives, so it is important to have the expertise available to make the decisions about getting the right balance from the start. Dr Alvarez-Pinera agreed this was an important

observation; a model could be created that would not predict the risks or it could predict such a huge number that it would be difficult to know what to do with the information. There was a need to work with risk assessment colleagues to help filter and prioritise the risks, whether microbiological or chemical. He confirmed that his team were in contact with Defra, ONS and other government departments.

127. The Chair remarked that the tools described were part of an evolving system which would become more accurate over time and would be useful in horizon scanning. He thanked Dr Alvarez-Pinera for the presentation.

Food and You Survey: Findings from Wave 4

128. Following the presentation, the Committee received at its January 2015 meeting on the findings of Wave 3 of the FSA's Food and You survey (FSA's flagship social survey of consumers' reported behaviours, attitudes and knowledge and relating to food safety and other associated topics), members asked to be updated on Wave 4[61]. At the January plenary meeting, Alice Rayner (FSA Social Science Research Unit) presented the findings of Food and You Wave 4. She highlighted that the survey used a random-probability sampling methodology to provide a robust representation of the UK population (excluding Scotland) aged 16 and above living in private households.

129. The specific objectives of Food and You Wave 4 were to:

- Explore public understanding of, and engagement with, the FSA's aim of improving food safety
- Identify specific target groups for future interventions (e.g. those most at risk or those among whom FSA policies and initiatives are likely to have the greatest impact)
- Describe the public attitudes towards food production and the food system
- Monitor changes over time (compared with data from Waves 1-3 or from other sources) of reported attitudes and behaviour
- Broaden the evidence base and develop indicators to assess progress in fulfilling the FSA's strategic plans, aims and targets

130. This survey involved 3118 interviews across England, Wales and Northern Ireland, conducted from May to September 2016, among a representative sample of adults aged 16 and over in the combined country report. The topics it covered: household information, eating habits, shopping, food safety, food issues, health, healthy eating (in Northern Ireland only) and general demographic information. It was underlined that although efforts have been made to maintain continuity in the questions asked across the waves, the survey has evolved with the changing responsibilities and priorities of the FSA.

131. Cooking, shopping and eating: the majority of respondents (88%) reported having at least some responsibility for cooking or preparing food in the home, with half (49%) saying they were responsible for all or most of this. Women were more likely than men to have all the responsibility (67% compared with 30%). Women were also more likely to cook for themselves or others at least five days a week (80% compared with 52% of men). Nine per cent of men and 2% of women said they cooked less than once a month or never.

132. The majority of respondents (58%) reported eating all breakfast and main evening meals at home in the last seven days. There was greater variability in the proportion of respondents reporting eating lunch at home, with 30% having eaten it at home on all days in the past week and 37% reporting having eaten lunch at home twice or less. The frequency of eating each meal at home was similar to that reported in the previous waves.

133. Allergy and intolerance: respondents who had experienced an adverse reaction or avoided foods due to the reaction they might cause were asked if they had experienced a reaction to a list of 14 foods. These 14 foods are allergens listed in the EU Food Information for Consumers Regulation, which must always be labelled in pre-packed and non-prepacked foods when used as an ingredient or processing aid. Of those who reported an adverse reaction or avoided certain foods, the most common foods that people reported having an adverse reaction to were cows' milk and cows' milk products (22%), cereals containing gluten (13%) and molluscs e.g. mussels, oysters (11%). Forty-three per cent reported having an adverse reaction to 'other' (not listed) foods.

134. Food security: 'Food security' explained to mean having access at all times to enough food that is both sufficiently varied and culturally appropriate to sustain an active and healthy life. The majority (83%) of respondents reported that their household had never worried in the last 12 months about running out of food before there was money to buy more. 89% said that in the last 12 months they had never experienced food running out and they did not have money to get more. A third (33%) of respondents aged 16 to 24 said they often or sometimes worried that the household food would run out before there was money to buy more compared with 6-7% of those aged 65 and over. A similar proportion (34%) of those in the lowest income quartile said they often or sometimes worried about running out of food before there was money to buy more, compared with 7% of those in the highest quartile. A higher proportion of respondents who were unemployed (47%) or categorised as having an 'other working status' 14 (34%) worried that the household food would run out before there was money to buy more compared with those who were in work (16%) or retired (7%). Similar patterns were seen with reported instances of food running out and being able to afford balanced meals.

135. Levels of food security varied across other subgroups. Sixteen per cent of those aged 16 to 24 and 11% of those aged 25 to 34 lived in food insecure

households compared with 1%–2% of those aged 65 and over. A quarter (23%) of those in the lowest income quartile lived in food insecure households compared with 3% in the highest quartile. Similarly, 35% of respondents who were unemployed and 18% with an 'other' working status14 lived in food insecure households compared with 7% of those in work and 2% of those who had retired.

136. Food safety at in the home (focussed on the index recommended practice (the 4 Cs): respondents in Northern Ireland had the highest average IRP score (72) compared with England (67) and Wales (69). Chilling food 58% reported that they defrosted meat/fish by leaving it at room temperature, not in line with FSA recommendations. Respondents were asked where in the fridge they stored raw meat and poultry. 60% reported that they stored this type of food on the bottom shelf of the fridge.

137. Eating outside of home (eating out in the last month): 67% had eaten at a restaurant; 55% had eaten takeaway; 41% had eaten in a café or coffee shop. Respondents in Northern Ireland were less likely to report eating in a pub, bar or nightclub in the past month compared with England and Wales (18% vs 39% and 36%).

138. Recognition of Food Hygiene Rating Scheme (FHRS): recognition by country Northern Ireland and Wales 89% and 82% England. Recognition was associated with age: 93% of those age 16 to 34 recognised the images compared with 43% of those aged 75 and over. Recognition of FHRS sticker has increased 34 % in 2012; 68% in 2014 and 83% in 2016.

139. Food poisoning: 44% claimed to have ever had food poisoning. Men were more likely than women to report having had food poisoning (47% compared 43%).

140. Food production and the food system (food authenticity): confident that food is what it says it is on the label or menu (always 34%; most of the time 52%; rarely/never 3%). Action taken in the past when not confident food was what it said it was on the menu or label.

141. Chemicals in food: respondents have low level of understanding about chemicals in food. Almost two thirds (62%) of respondents agreed that they would like more information about what they can personally do to limit the presence of chemicals in food.

142. In conclusion, the following points were made:

- Time series data analysis shows changes over time in people's self-reported behaviors and attitudes
- New questions highlight:
  - important insights for FSA's work
  - provide wider insights people's food practices

- Standing questions relating to core parts of the FSA's consumer facing work show a number of good news stories
- However, some questions also point to some areas where future work might be targeted

143. It was noted that Wave 5 fieldwork will commence this year, with the report due to be published in 2019.

144. A member referring to the non-white ethnicity group (black/Asian/mixed/other) asked if there was a break-down of this grouping. It was confirmed that although data for this group could broken-down, the difficulty with the sample size available for the subsets that make-up this group are so small that is why data has been lumped together (in all the Food and You Surveys) and presented as non-white ethnicity. It was explained that although a small indication could be obtained from the broken-down data the resulting information would be unreliable. However, Joy Dobbs (SSRC ex-officio) indicated that as secondary analysis would be carried on these findings these could be broadened to cover all the Food and You Waves where data relating to non-white ethnicity could pulled out and distilled to look at ethnic differences and any significant revelation.

145. As the chapter on food poisoning mentioned throwing food away "I always avoid throwing food away (62% compared with 58% in Wave 3, 52% in Wave 2 and 48% in Wave 1)" a member asked if there was any correlation between the 4Cs (chilling, cooking, cleaning and avoiding cross-contamination) and use-by-date. The response remarked that the findings in this section reveal small correlation which may be suggesting a link in food safety behaviour but the data showed no trend.

146. Referring to a news story (on the BBC) on best before dates in autumn 2016, a member asked if data collection for the above survey covered the fourth quarter of 2016 when the story was published. It was confirmed that survey was carried out between May and September 2016.

147. As it was acknowledged that there are message resistant groups in the population and understanding why they ignore food safety advice would be useful, there was the suggestion if future surveys could consider questions such as "why don't you like to use "use-by dates" or "why do you still wash your chicken". It was agreed that the suggested questions would be appropriate for focus group settings not for surveys.

148. A member mentioned that the issue of use-by dates was discussed at the horizon scanning workshop (that was held a day before the meeting) and there were suggestions on what might be driving families to go beyond the use-by dates. It was noted that the FSA was looking at the current guidance on "use-by dates and best before dates".

149. In summarising the Chair thanked Alice Rayner for the presentation and underlined the significance of the Food and You surveys. He mentioned that some of the findings from Wave 4 was helpful in the drafting of the *Campylobacter* report. He stated that as the presentation had covered the top-level overview of the survey members may wish to go into the full report to drill down into detailed findings of the survey.

Epidemiology of Foodborne Infections Group

150. The Committee was briefed by Dr Paul Cook EFIG Chair on the activities of the Epidemiology of Foodborne Infections Group (EFIG) in 2018[62-64]. This covered updates on: animal and human infections data, food surveillance activities and studies related to foodborne infections.

Animal data *Salmonella* update

151. Animal data (provisional) between January and December 2016 showed that reports of *Salmonella* in livestock fell by 5% in comparison to January – December 2015 and by 8% in comparison to January – December 2014. There were seven reports of *S*. Enteritidis compared with nine during the equivalent period of 2015. Reports of *S*. Typhimurium and the monophasic strain *Salmonella* 4,5,12:i:- increased (by 12% and 18% respectively) during January – December 2016 compared with the equivalent period of 2015, but reports of *Salmonella* 4,12:i:- decreased by 44%. The most commonly reported phage types of *S*. Typhimurium were DT2, DT104 and U288 whilst phage type DT193 was the most commonly reported phage type for both *Salmonella* 4,5,12:i:- and *Salmonella* 4,12:i.

152. Between January and December 2017, there were 1,116 reports of *Salmonella* from livestock, which is 4% higher than during the same period of 2016 (1,072 reports). This increase was mainly due to increases in the number of reports from ducks (275 vs. 237 incidents), cattle (336 vs. 320 incidents) and non-statutory species (223 vs. 203 incidents). During January – March 2018 the number of reports of *Salmonella* in livestock decreased by 28% in comparison to January – March 2017 and by 11% compared with January – March 2016. An overview of some of the serotypes of the above *Salmonellas* was also provided.

153. Provisional *Salmonella* National Control Programme for 2016 showed the UK is well below the EU target prevalence of below 1% for breeding chickens, laying chickens, broiler chickens, breeding turkeys and fattening turkeys.

154. *Salmonella* NCP Programme, summary UK results in 2017 revealed a big difference between layers and broilers in the prevalence of *Salmonella*. Laying chickens: Prevalence of regulated serovars was 0.14% which is lower than the EU target of 2% for adult laying hen flocks. Broilers: prevalence of regulated serovars was 0.01%, which is lower than the EU target of 1% for broiler flocks and prevalence of all serovars was 1.45%.

Breeding chicken: prevalence of regulated serovars was 0%, well below the EU target of 1% for adult breeding flocks.

155. Breeding turkeys had nil regulated serovars, whereas the EU target is 1%. The prevalence for the non-regulated serovars was 1.99%, which represents only 5 flocks owing to the low number of breeding turkey flocks in the UK. Fattening turkeys: prevalence of regulated serovars was 0.27%, well below the EU target (1%) for fattening turkey flocks. The prevalence for all serovars in fattening turkeys was 12.6%. The regulated serovars (*Salmonella* Enteritidis, *Salmonella* Typhimurium and its monophasic forms) are controlled because of their public health significance. Results revealed higher levels of non-regulated *Salmonella* in turkeys compared to chicken, but these are predominantly strains of *S*.Derby not thought to be associated with human illness.

156. Human infection data (key pathogens for 2016): trend in laboratory reports revealed:

157. 9619 reports of non-typhoidal *Salmonella* in 2016, a small increase (1.3%) from the 9492 reported in 2015. An increase in the reporting rate was seen in all constituent countries. Reports of *S.* Enteritidis decreased in the UK, driven primarily by a decrease in cases reported in England; increases were seen in Wales and Scotland from 2015. An increase in the reporting rate of *S.* Typhimurium was seen in 2016 compared to 2015 with an increase of 75 cases. An increase in reporting rate was seen in England and Northern Ireland for the second year, while the reporting rate in Wales and Scotland decreased. England, Wales and Scotland reported more *S.* Enteritidis cases than any other serovar, while Northern Ireland reported more *S*. Typhimurium cases. Scotland reported the largest proportion of *S.* Enteritidis cases compared to all *Salmonella* spp. reported (43%), compared to 37% in Wales, 27% in England and 25% in Northern Ireland. Together *S.* Enteritidis and *S.* Typhimurium constituted 49% of the non-typhoidal *Salmonella* reported in the United Kingdom. In addition to these, *S.* Infantis and *S.* Agona are within the top 10 most commonly identified serovars in all four countries. The top 10 serovars comprised 63% of all reported *Salmonella* infections in England, 71% in Wales, 77% in Northern Ireland.

158. In 2016 the serovars with the highest proportion of cases reporting travel prior to infection were *S.* Kentucky and *S.* Stanley (55% reported travel) In 2015 the serovar with the highest proportion reporting travel was also *S.* Kentucky (56%). A greater proportion of *S.* Enteritidis cases reported travel than *S.* Typhimurium cases (34% versus 17%). A rise in the number of travel associated cases in 2016 was noted. As the reason for this increase was not clear, PHE agreed to consider feasibility of reporting on travel destination information in future reports.

159. The reporting rate for *Campylobacter* has decreased in the UK from 96.9 per 100,000 population in 2015 to 90.5 per 100,000 in 2016. The rate of reported *Campylobacter* infections in England over the last decade has

decreased to the lowest rate reported since 2008 and remains below the rate observed in Wales and Scotland. Northern Ireland continues to report rates lower than the rest of the United Kingdom (67.9 cases per 100,000 population). It was reported that in England the region with the highest number of reported cases of *Campylobacter* in 2016 was the South East with just over 9000 cases. More male *Campylobacter* cases were reported than female cases (55% vs 45%) in England in 2016.

160. Although there was an increase in the number of reported *Listeria monocytogenes* infections in 2016 (15 more cases compared to 2015), the significance of this is difficult to assess because of the small numbers involved.

161. Reports of STEC O157 in the UK increased by 84 cases in 2016 compared to 2015 with half of these cases being in England. Increases were seen in all countries other than Scotland, with the largest increase in reporting rate in Northern Ireland where nearly two times more cases were reported in 2016 compared to 2015. Members noted the number of cases detected with the 10 most commonly detected STEC serotypes across the UK in 2016. Serotype O157 is the most common. It was underlined that population incidence was not calculated as serotypes other than O157 are likely to have been under-detected due to current laboratory testing methods. Serotype O26 is the most commonly detected non-O157 serotype in the UK. There was discussion on the number of labs testing for O157 and non-O157.

162. In 2016, 48 foodborne outbreaks were reported to eFOSS in England and Wales and to Health Protection Scotland. There were no reported outbreaks in Northern Ireland in 2016. There were 901 laboratory confirmed cases and 117 reported hospitalisations. Eleven national outbreaks were reported. The same number of *Salmonella* outbreaks was reported in 2016 as in 2015, and there were reductions in the number of *Campylobacter* and *C. perfringens* outbreaks. *Salmonella* was the most commonly implicated pathogen (12/48, 25%), however other/unknown pathogens comprised more outbreaks (13/48, 27%). These include ten norovirus outbreaks, one *Staphylococcus aureus* outbreak, one Enteroinvasive *E. coli* outbreak and one outbreak of unknown aetiology. In relation to outbreaks linked to *Campylobacter* it was noted that chicken liver pâté is still an issue. The majority of foodborne outbreaks occurred in the food service sector (34/48, 71%), followed by community (6/48, 13%). Of the food service sector outbreaks, the majority of these occurred in restaurants, pubs and takeaways (25/34, 74%).

163. Human infection data key pathogens for 2017: trend in laboratory reports revealed: 10,089 reports of non-typhoidal *Salmonella* in 2017, a small increase from the 9619 reported in 2016. An increase in the reporting rate was seen in England and Wales, and a decrease in Scotland and Northern Ireland. The overall number of reported infections increased in the UK by 470.

164. Reports of *S.* Enteritidis decreased in the UK, due to decreases across all countries other than England where there was a small increase in cases reported. An increase in the reporting rate of *S.* Typhimurium was seen in 2017 compared to 2016 with an increase of 201 cases. *S.* Enteritidis was the most commonly reported serovar across all constituent countries. The serovars with the highest proportion of cases reporting travel prior to infection were *S.* Kentucky (59% of cases reported foreign travel) and *S.* Stanley (55% of cases reported foreign travel).

165. The reporting rate for *Campylobacter* has increased in the UK from 89.8 per 100,000 population in 2016 to 96.8 per 100,000 in 2017. The rate of reported *Campylobacter* infections in England has increased from 2016 to 2017 after a steady decline in the reporting of cases from 2012. The reporting rate has also increased across all other countries. Members noted the narrowing gap in the reporting rate of cases in Northern Ireland compared to the other UK countries.

166. There was a decrease in the number of reported *Listeria monocytogenes* infections in 2017 by 42 cases compared to 2016 to the lowest number of cases reported in the last ten years.

167. Reports of STEC O157 in the UK decreased from a rate of 1.5 cases per 100,000 population in 2016 to 1.2 cases per 100,000 population in 2017. Decreases were reported by all UK countries, with the largest decrease in reporting rate in Northern Ireland. Numbers of the ten most commonly reported STEC serotypes among clinical infections across the UK in 2017 were highlighted.

168. Members noted that in 2017, 40 foodborne outbreaks were reported in the UK compared to 48 reported in 2016. There were 1,425 cases, 840 of which were laboratory confirmed, and 167 reported hospitalisations, an increase in reported hospitalisations by 50 cases compared to 2016. There were three reported deaths from two *Salmonella* outbreaks, compared to 0 deaths reported in 2016.

169. A member referring to the reporting rate for *Campylobacter* in humans that had increased in 2017 questioned how this related to the continuous reduction in the prevalence of *Campylobacter* in chicken sold in retail outlets (2017 recorded the lowest prevalence in chicken) as poultry is mainly linked with most cases. He asked if this observation was discussed at the July 2018 EFIG meeting. It was noted that the FSA in conjunction and other public health agencies were looking at the trends to see what factors could be attributed to these increases in cases. In the analysis of data, the suggestion of having a means of detecting noise in the system before a conclusion is reached in relation to real change was flagged.

170. Other items EFIG considered include: PHE's report on excess burger consumption amongst STEC cases in England, 2014-2017, raw drinking milk (incidents and outbreaks), FSA's regulating our future programme, FSA's surveillance strategy, how PHE employ whole genome sequencing (WGS) for *Salmonella* outbreak investigations, updates on food

surveillance activities in England, Wales and Scotland and issues relating to antimicrobial resistance in the food chain.

Horizon scanning workshop: 25 January 2018

171. In January (a day before the plenary meeting) the Committee held a horizon scanning workshop. This included two presentations: one from the Chief Scientific Adviser and the other from a member of the FSA team working on EU exit. As there was insufficient time to rank the topics that were identified at the workshop, members agreed to consider this at a later date.

172. At the May plenary meeting a summary of the output of the horizon scanning workshop was presented to members[65]. In the Committee's discussions members had identified topics in the following categories:

- Emerging issues resulting from real changes in behaviour
- Information that needs to be brought to the FSA's attention to help consumers make choices based on current evidence
- Risks/opportunities associated with emerging technologies not already considered by the ACMSF
- The main issues, risks and opportunities following UK exit from the EU
- Anything else to bring to the FSA's attention.

173. Members were asked to consider ranking the shortlisted topics in each of these categories with a view to deciding which should be added to the ACMSF workplan.

174. The workshop had also discussed the need to consider introducing a 2-dimensional approach to risk assessment which took into account severity in addition to probability. Members were asked if the time was right to set up a subgroup to explore this in greater depth. Members agreed to do this and Dr Gary Barker agreed to chair the new group.

175. A member raised whether another emerging topic was the use of bee pollen particularly for children in school and whether this should be added to the list. It was suggested that this had been discussed by the Advisory Committee on Novel Foods and Processes (it was subsequently confirmed that bee pollen has not been considered by ACNFP as it is not a novel food).

176. Members noted that there were a number of items on the list that were already being addressed (e.g. raw pet food) and there were a number of related issues that could be grouped together (e.g. EU-related issues). The Secretariat agreed to condense the list before sending it out for members to rank.

177. At the October plenary meeting the topics members identified as current and emerging microbiological issues were prioritised[66]. The secretariat

was asked to use the highest numerical ranking in terms of urgency to decide topics to go on the workplan.

ACMSF Ad Hoc and Working Groups

Committee updates

ACMSF fixed-term task and finish group's report on AMR

178. The above group's report (AMR in the food chain; research questions and potential approaches) was approved for publication in January and presented to the FSA Board in September.

Working Group on Antimicrobial Resistance

179. The Working Group on AMR resumed its activities following the publication of the fixed-term task and finish group's report on AMR. The issues they considered at the meeting they include:

- FSA funded surveys for antimicrobial resistance in UK retail meat samples
- FSA Board paper on AMR including the report of the ACMSF Task and Finish Group and new research
- UK Veterinary Antibiotic Resistance and Sales Surveillance Report (UK-VARSS 2017)
- UK AMR Strategy
- Update on the activities of the Defra Antimicrobial Resistance Coordination
- *E.coli* ST131-H22 as a foodborne Uropathogen

Ad Hoc Group on *Campylobacter* – Draft Report

180. The group's draft report was considered by the full Committee early in 2018. Most of the group's activities in 2018 were carried out via correspondence.

Ad Hoc Group on representation of risks

181. The above group that the Committee agreed to setup at the May plenary meeting to develop a new risk assessment framework for ACMSF had its first meeting on 12 November 2018. The group is chaired by Dr Gary Barker.

Working Group on Newly Emerging Pathogens

182. The group considered the FSA's literature review on the risks associated with the consumption of human placenta - considering microbiological, clinical and food safety issues. The group has a meeting scheduled for early 2019 to conclude their deliberations.

Changes to plant protection products maximum residue levels: potential impact on food safety

183. The Committee was updated on the discussions the Chair had with the Chair of the expert Committee on Pesticides Residues in Food in April 2018. They recognised the need to work with industry in order to have a clear picture of the issues of concern relating to microbiological food safety. They agreed that ACMSF should issue a letter to interested parties seeking evidence on the concerns raised at ACMSF meetings on the implications of changes to the maximum residue levels for quaternary ammonium compounds and biocidal actives**.** The Committee agreed to setup a cross SAC group to analyse the responses from interested parties. The small group would include ACMSF members, representative from the FSA, appropriate expertise from the Expert Committee on Pesticide Residues in Food, representation from Health and Safety Executive and ACMSF Secretariat.

Outcome and Impact of ACMSF Advice

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

185. AMR in the food chain: The Committee at its January plenary meeting approved the fixed term task and finish group on AMR's report (AMR in the food chain; research questions and potential approaches). The report that made recommendations in 8 areas was well received by the FSA Board. Paper FSA 18-09-11[67] considered by the FSA Board in September 2018 (paragraphs 22 to 29) outlined how the FSA will take forward the recommendations in the report.

186. Raw Drinking Milk Controls: The Committee worked with the FSA in agreeing a revised risk assessment on the microbiological risk associated with the consumption of RDM in the UK. The risk assessment highlighted that increased risk reflects greater levels of exposure due to increases in the number of registered producers and volume of production and consumption, alongside an increase in the number of outbreaks of human

illness associated with RDM. The following risk and uncertainty classifications were agreed:

• the risk for RDM consumers is currently considered to be medium (occurs regularly) with medium uncertainty.
in terms of milkshakes, smoothies and ice-cream made using RDM, the current risk for the RDM consumers that consume these products is considered medium (occurs regularly) with a high level of uncertainty.
• the risk is considered to be negligible (i.e. so rare that it does not merit to be considered) with low uncertainty for the remainder of the population who do not consume RDM or milkshakes, smoothies and ice-cream made using RDM. This last group is considered so as to provide a baseline against which to benchmark the above groups.

187. This risk assessment guided the review of the official controls for RDM.

188. Shiga toxin producing *E. coli (*STEC) in food. The Committee was asked to review its opinion on the risk from STEC in raw and ready-to-eat foods to support decision making regarding the safety of these products. The Committee comments were welcomed by the FSA risk managers in the approach it employs in dealing with foods contaminated with STEC.

189. Risk assessment in relation to humans on the use of raw pet food. Committee opinion on a paper on the risks to humans associated with the use of raw pet food was taken into account by the FSA. Although the Committee underlined that some of the issues raised in the risk assessment were more appropriate for Advisory Committee on Animal Feeding Stuffs.

190. Changes to plant protection products maximum residue levels: potential impact on food safety. The Committee's intervention on the changes to plant protection products MRLs rules seeking evidence from industry in order to have a clear picture of all the issues of concern relating to microbiological food safety has been welcomed by the FSA and the food and industry biocide group. A cross Scientific Advisory Committee working group has been established to assess this complex issue.

Information papers

191. 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 2018 were:

NO. OF PAPER	NAME OF PAPER	MEETING NUMBER	DATE OF MEETING
ACM/1260	ACMSF Workplan	91st	25 January 2018
ACM/1261	Risk assessment on *M. bovis*	91st	25 January 2018
ACM/1262	Update from other committees	91st	25 January 2018
ACM/1263	FSA Board paper on Antimicrobial Resistance	91st	25 January 2018
ACM/1264	The FSA's preparation for the UK's exit from the EU	91st	25 January 2018
ACM/1265	EFSA Opinion on hepatitis E virus as a food-borne pathogen	91st	25 January 2018
ACM/1266	Items of interest from the literature	91st	25 January 2018
ACM/1267	*Campylobacter* Trends 2015-2017	91st	25 January 2018
ACM/1275	ACMSF Work plan	92nd	10 May 2018
ACM/1276	Update from other Scientific Advisory Committees	92nd	10 May 2018
ACM/1277	Items of interest from the literature	92nd	10 May 2018
ACM/1278	Fixed-term task and finish group on antimicrobial resistance: AMR in the food chain; research questions and potential approaches	92nd	10 May 2018
ACM/1279	Recent publications from EFSA	92nd	10 May 2018
ACM/1287	ACMSF Work plan	93rd	18 October 2018
ACM/1288	Update from other Scientific Advisory Committees	93rd	18 October 2018

ACM/1289	Items of interest from the literature	93rd	18 October 2018
ACM/1290	*E. coli* O157 super-shedding in cattle & mitigation of human risk	93rd	18 October 2018
ACM/1291	Pesticide Residues MRLs: Potential Impact on Food Safety	93rd	18 October 2018

Chapter 3: A Forward Look

Future work programme

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

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

194. The newly established group on representation of risks setup to develop a two-dimensional risk assessment framework for use in risks considered by ACMSF is working on a defined timescale to produce a report by summer 2019.

195. The Committee will setup a subgroup to review the FSA's guidance on the vacuum and modified atmosphere packaged chilled foods once evidence from ongoing studies are available.

196. The cross-SAC group setup to consider the effect on microbiological food safety of the changes made to the maximum residue levels for quaternary ammonium compounds and biocidal actives intend to collaborate with industry to obtain relevant evidence that can be used to assess the impact of these changes on food safety.

197. The Working Group on AMR has resumed its role in relation to providing advice to the FSA on issues relating to AMR and the food chain.

198. The Committee, through its standing Surveillance Working Group, will continue to provide advice as required on the Government's

microbiological food surveillance programme and any other surveillance relevant to foodborne disease.

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

200. Details of the Committee's work plan for 2018/19 can be found at Annex II.

Annex I

Papers Considered by ACMSF in 2018

NO. OF PAPER	NAME OF PAPER	MEETING NUMBER	DATE OF MEETING
ACM/1253	Matters arising	91st	25 January 2018
ACM/1254	First Draft of ACMSF Report on *Campylobacter*	91st	25 January 2018
ACM/1255	ACMSF fixed-term task and finish group on antimicrobial resistance	91st	25 January 2018
ACM/1256	Raw drinking milk (and certain raw milk products)	91st	25 January 2018
ACM/1257	Food and You Survey: Findings from Wave 4	91st	25 January 2018
ACM/1258	Epidemiology of Foodborne Infections Group	91st	25 January 2018
ACM/1259	Dates of future meetings	91st	25 January 2018
ACM/1260	ACMSF Workplan	91st	25 January 2018
ACM/1261	Risk assessment on *M. bovis*	91st	25 January 2018
ACM/1262	Update from other committees	91st	25 January 2018
ACM/1263	FSA Board paper on Antimicrobial Resistance	91st	25 January 2018
ACM/1264	The FSA's preparation for the UK's exit from the EU	91st	25 January 2018
ACM/1265	EFSA Opinion on hepatitis E virus as a food-borne pathogen	91st	25 January 2018
ACM/1266	Items of interest from the literature	91st	25 January 2018

ACM/1267	*Campylobacter* Trends 2015-2017	91st	25 January 2018
ACM/1268	Matters arising	92nd	10 May 2018
ACM/1269	Raw drinking milk (and certain raw milk products)	92nd	10 May 2018
ACM/1270	Risks associated with raw pet food	92nd	10 May 2018
ACM/1271	Epidemiology of Foodborne Infections Group	92nd	10 May 2018
ACM/1272	Outcomes from 25 January 2018 horizon scanning workshop	92nd	10 May 2018
ACM/1273	Changes to pesticides maximum residue levels: potential impact on food safety	92nd	10 May 2018
ACM/1274	Dates of future meetings	92nd	10 May 2018
ACM/1275	ACMSF Work plan	92nd	10 May 2018
ACM/1276	Update from other Scientific Advisory Committees	92nd	10 May 2018
ACM/1277	Items of interest from the literature	92nd	10 May 2018
ACM/1278	Fixed-term task and finish group on antimicrobial resistance: AMR in the food chain; research questions and potential approaches	92nd	10 May 2018
ACM/1279	Recent publications from EFSA	92nd	10 May 2018
ACM/1280	Matters arising	93rd	18 October 2018
ACM/1281	Shiga toxin producing *E. coli* (STEC) in food	93rd	18 October 2018
ACM/1282	FSA's guidance on vacuum and modified atmosphere packed	93rd	18 October 2018

	chilled foods with respect to *Clostridium botulinum*: relevant scientific publications over the past 10 years		
ACM/1283	FSA Surveillance Strategy	93rd	18 October 2018
ACM/1284	Epidemiology of Foodborne Infections Group	93rd	18 October 2018
ACM/1285	Outcomes from 25 January 2018 horizon scanning workshop	93rd	18 October 2018
ACM/1286	Dates of future meetings	93rd	18 October 2018
ACM/1287	ACMSF Work plan	93rd	18 October 2018
ACM/1288	Update from other Scientific Advisory Committees	93rd	18 October 2018
ACM/1289	Items of interest from the literature	93rd	18 October 2018
ACM/1290	*E. coli* O157 super-shedding in cattle & mitigation of human risk	93rd	18 October 2018
ACM/1291	Pesticide Residues MRLs: Potential Impact on Food Safety	93rd	18 October 2018

Annex II

ACMSF Forward Work Plan 2018/19

Last reviewed October 2018

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

ACMSF Terms of reference

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

	Topic	Progress	Expected Output
1	**Horizon scanning** Horizon scanning workshop for members to assess emerging microbiological issues of concern and rank issues in terms of strategic priority and urgency	**Workshop was held in January 2018** Committee will consider follow-up to the above workshop at the October 2018 plenary meeting.	List of outputs from the workshop including short-listed priorities for more in-depth consideration.

	Topic	Progress	Expected Output
2	**Newly Emerging Pathogens** The Newly Emerging Pathogens Working Group provides advice on the significance and risks from newly emerging or re-emerging pathogens through food chain exposure pathways.	Continuous.	The Committee to draw the FSA's attention to any risks to human health from newly emerging pathogens via food.
3	**Microbiological Surveillance of food** The Surveillance Working Group provides advice as required in connection with the FSA's microbiological food surveillance programme and any other surveillance relevant to foodborne disease.	Working group activities are continuous.	Surveillance Working Group/Committee comments on survey protocols and survey results for consideration by FSA in their microbiological food surveillance activities.
4	**Developing trends in relation to foodborne disease** The Committee receives updates on research, surveys, investigations, meetings and conferences of interest.	As issues arise. EFIG[3] update will be provided at the May and October 2018 and January 2019 meetings.	ACMSF provides comments on the updates it receives for the FSA's consideration.

[3] Epidemiology of Foodborne Infections Group

	Topic	Progress	Expected Output
5	**International and EU developments on the microbiological safety of food** The Committee is updated on issues of relevance and significant developments at an EU and international level on microbiological food safety, such as EFSA opinions and Codex Committee on Food Hygiene meetings.	As issues arise.	ACMSF to note updates and provide comments if desired.
6	**Microbiological incidents and outbreaks** The views of the Committee will be sought where necessary and updates provided on outbreaks of significance.	As issues arise.	ACMSF assessment of the risks in relation to significant microbiological outbreaks/incidents.
7	**Antimicrobial resistance** ACMSF's role through its Working Group on AMR is to assess the risks to humans from foodborne transmission of antimicrobial-resistant microorganisms and provide advice to the FSA.	The subgroup considers developments and emerging issues in relation to antimicrobial resistance and food chain. Working group activities are continuous. Summaries of discussions and recommendations are provided at plenary meetings.	ACMSF assessment of the key risks to the food chain which may have consequences for human health and identification of key research or surveillance gaps in relation to the food chain.

	Topic	Progress	Expected Output
8	***Ad Hoc* Group on *Campylobacter*** In June 2015, the FSA and ACMSF agreed that as it was 10 years since the Committee issued its last report on *Campylobacter* in the food chain, an expert subgroup should be set up to revisit this area and provide a more up to date picture, given that reducing *Campylobacter* in chicken was a key strategic priority for the Agency in recent years.	The group presented its draft report at the January 2018 plenary meeting. Comments made on report at the meeting are being considered and report will subsequently be issued for public consultation.	ACMSF's update on the Second *Campylobacter* report published in 2005 and an assessment of progress made (by the FSA) in addressing the Committee's recommendations in the 2005 *Campylobacter* report.
9	**Social science research relating to microbiological food safety risks**	The Committee will receive updates on the findings of social science research which may have a bearing on the assessment of microbiological food safety risks.	ACMSF to note updates and provide comments if desired.
10	**FSA Board's New Approach in relation to Rare Burgers**	The Committee will be updated on work the FSA is undertaking following the FSA Board's decision on rare burgers.	Committee to be kept informed of progress and to contribute to the work where appropriate.

	Topic	Progress	Expected Output
11	**Changes to plant protection product MRLs: potential impact on food safety**	Members were alerted to this issue of changes to maximum residue levels (MRLs) for two quaternary ammonium compounds (QACs), chlorate and biocidal actives which are used as disinfectants/sanitisers in the food industry at the October 2015, January 2016 and January 2017 meetings. The Committee agreed to the FSA's suggestion to setup a cross SAC working group to facilitate a full discussion to take place. Establishment of a group is on hold. Committee to be updated on recent activities on the above subject at the October 2018 meeting.	ACMSF to consider the evidence in this area with respect to impacts on food safety and to provide advice to the FSA.
12	**FSA Surveillance Strategy**	The Committee will receive a presentation on the Food Standards Agency's new approach to food surveillance.	ACMSF to note this approach to food surveillance and provide comments if desired.
13	**FSA's guidance on vacuum and modified atmosphere packed chilled foods**	Committee to consider current evidence on vacuum and modified atmosphere packed chilled foods in the past 10 years and the ongoing work at the Quadram Institute.	ACMSF assessment on whether to refresh it advice on this subject.
14	**Shiga toxin producing *E. coli* (STEC) in food**	The FSA will ask the Committee (at the October 2018 ACMSF meeting) to review its	ACMSF assessment of the amount of information available and employed to

	Topic	Progress	Expected Output
		opinion on the risk from STEC in raw and ready-to-eat foods to support decision making regarding the safety of these products.	determine the current level of risk from STEC.
15	**Risk assessment outputs**	Committee to revisit its approach to how it expresses risk assessment outputs.	Improved consistency and clarity in framing risk assessment outputs.
16	**African swine fever – risk assessment related to exposure via the food chain**	A draft risk assessment will be presented to the Committee at the January 2019 meeting on the risk to consumers from African swine fever via the food chain.	The Agency is looking for endorsement of this assessment and the overall risk via the food chain from the Committee.

Annex III

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

Terms of reference

ACMSF

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

Surveillance Working Group

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

Newly Emerging Pathogens Working Group

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

Antimicrobial Resistance Working Group

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

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

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

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

Fixed-term task and finish group on antimicrobial resistance

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

Ad Hoc Group on *Campylobacter*

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

Ad Hoc Group on representation of risks

- To propose a multidimensional representation of risk and total uncertainty that is suitable for food risks considered by ACMSF.
- The group's remit will include continued communication of its work and outputs to the ACMSF and the FSA.
- The group's remit will **not** include consideration of issues relating to risk management and risk communication (including perception).

Membership Tables

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Chair							
Professor S J O'Brien[4]	Professor of Infection Epidemiology and Zoonoses, University of Liverpool, Institute of Infection and Global Health, National centre for Zoonosis Research						✓
Professor D McDowell[5,6]	Emeritus Professor of Food Studies University of Ulster	✓	✓	✓	✓	✓	✓
Members							
Dr G Adak	Head of Gastrointestinal Infection Surveillance, Department of Gastrointestinal, Emerging & Zoonotic Infections, Health Protection Services Colindale	✓	✓				

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

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

[7] *Ex officio* appointment (Member of Social Science Research Committee)

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

		ACMSF	Surveillance Working Group	Newly Emerging Pathogens Working Group	AMR Working Group	AMR Task & Finish Group	*Ad Hoc* Group on Campylobacter
Dr D Tucker	Senior Lecturer in Veterinary Public Health/pig medicine, University of Cambridge	✓		✓	✓	✓	✓
Mrs A Williams	Consumer representative	✓					✓
Co-opted Members							
Prof R E Holliman	Consultant Clinical Microbiologist - Retired					✓	
Prof John Coia	Consultant Microbiologist, NHS Greater Glasgow and Clyde					✓	
Prof S Forsythe	Member of Advisory Committee on Animal Feedingstuffs (ACAF)				✓	✓	
Mr C Teale	Animal and Plant Health Agency				✓	✓	
Prof J Threlfall	Formerly Health Protection Agency				✓	✓	
Prof D Stekel	School of Biosciences, University of Nottingham					✓	
Prof R La Ragione	School of Veterinary Medicine, University of Surrey					✓	

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

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

Annex IV

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

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

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

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

Member	*Personal interests*		*Non-personal interests*	
	Name of company	**Nature of interest**	**Name of company**	**Nature of interest**
Antimicrobial Resistance Working Group				
Professor S Forsythe	None		None	
Mr C Teale	None		None	
Prof J Threlfall	None		None	
AMR Task & Finish Group				
Prof R Holliman	None		None	
Prof J Coia	Tesco UK	Ad Hoc medico-legal work on infection related matters Consultancy work	Various	Funding for research projects
Prof D Stekel	None		None	
Prof R La Ragione	None		None	
Dr A Charlett	None		None	
Prof J Rushton	None		None	

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

Annex V

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

Public service values

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

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

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

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

Standards in public life

All Committee members must:

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

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

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

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

Role of Committee members

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

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

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

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

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

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

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

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

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

The role of the Chair

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

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

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

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

DEPARTMENTAL ASSESSORS AND THE SECRETARIAT

Departmental assessors

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

The Secretariat

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

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

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

Handling conflicts of interest

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

(i) Declaration of Interests to the Secretariat

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

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

(ii) Declaration of Interests and Participation at Meetings

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

- their interest is direct and pecuniary; or

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

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

Personal liability of Committee members

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

Appendix 1

THE SEVEN PRINCIPLES OF PUBLIC LIFE

Selflessness

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

Integrity

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

Objectivity

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

Accountability

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

Openness

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

Honesty

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

Leadership

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

Appendix 2

DIFFERENT TYPES OF INTEREST

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

Personal Interests

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

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

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

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

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

Non-Personal Interests

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

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

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

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

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

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

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

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

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

DEFINITIONS

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

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

- Trade associations representing companies involved with such products;

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

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

Annex VI

GOOD PRACTICE GUIDELINES FOR THE INDEPENDENT SCIENTIFIC ADVISORY COMMITTTEES

PREAMBLE

Guidelines 2000: Scientific Advice and Policy Making[8] 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*[9] (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*[10] 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.

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

THE GOOD PRACTICE GUIDELINES

These Guidelines have been developed by 9 advisory committees:

Advisory Committee on Animal Feedingstuffs[11]
Advisory Committee on Microbiological Safety of Foods
Advisory Committee on Novel Foods and Processes
Advisory Committee on Research
Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment[12]
Committee on Mutagenicity of Chemicals in Food, Consumer Products and the Environment[13]
Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment[14]
Scientific Advisory Committee on Nutrition[15]
Spongiform Encephalopathy Advisory Committee[16]

These committees share important characteristics. They:

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

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

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

[11] FSA Secretariat
[12] Joint FSA/HPA Secretariat, HPA lead
[13] Joint FSA/HPA Secretariat, HPA lead
[14] Joint FSA/HPA, FSA lead
[15] Joint FSA/DH Secretariat
[16] Joint Defra/FSA/DH Secretariat

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

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

Principles

Defining the issue

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

Seeking input

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

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

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

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

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

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

Validation

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

9. If qualitative data have been used, they will be assessed by the committee in accordance with the principles of good practice, e.g. set out in guidance from the Government's Chief Social Researcher[17].

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

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

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

Uncertainty

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

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

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

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

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

Drawing conclusions

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

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

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

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

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

Communicating committees' conclusions

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

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

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

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

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

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

Glossary of Terms

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

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

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

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

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

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

Glossary of Abbreviations

ACMSF: Advisory Committee on the Microbiological Safety of Food

APHA: Animal and Plant Health Agency

AMR: Antimicrobial Resistance

COC: Committee on Carcinogenicity

COM: Committee on Mutagenicity

Defra: Department for Environment Food and Rural Affairs

DALYs: Disability Adjusted Life Years

EFIG: Epidemiology of Foodborne Infections Group

EFSA: European Food Safety Authority

FOI: Freedom of Information

FSA: Food Standards Agency

OCPA: Office of the Commissioner for Public Appointments

QALYs: The quality-adjusted life year

STEC: Shiga toxin-producing *Escherichia coli*

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

WGS: Whole genome sequencing

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