ACMSF Report 2020

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Chapter 2: The Committee's Work in 2020

Ad Hoc Group on non-proteolytic *Clostridium botulinum* and vacuum and modified atmosphere packaged foods

24. The subgroup on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged (VP/MAP) food was setup in June 2019 to review the evidence on key aspects relating to the risk of non-proteolytic *C botulinum* and VP/MAP foods. In January 2020, Prof David McDowell (Chair of the group) introduced the group's report (paper ACM/1322). He thanked members of the group who had drafted the report, the secretariat for their support and industry (British Meat Processors Association and the Chilled Food Association) who presented evidence that the group considered. Prof McDowell presented the report by systematically going through the terms of reference, the executive summary, conclusions, recommendations, and a section that covered other aspects on the issue of non-proteolytic *C. botulinum* and VP/MAP foods. The group's terms of reference was to:

- Review the FSA guidelines for the shelf-life of vacuum and modified atmosphere packaged foods and the risk posed by non-proteolytic *C. botulinum*, and other pathogens where appropriate, from these foods. This group will consider the 1992 ACMSF Report on Vacuum Packaging and Associated Processes, but it is outside the scope of this group to review that document.

- Specifically review the industry funded risk assessment of botulism from chilled, VP/MAP fresh meat held at 3°C to 8°C (Peck, 2019).

- Where appropriate consider other risk-related evidence relevant to this topic made available to the FSA and the ACMSF during the lifetime of the group.

25. The report's conclusions highlighted that the subgroup reviewed three areas underpinning the current FSA guidance: thermal inactivation parameters, challenge testing and spore loading, as well as a report of an industry funded study concerning fresh meat.

26. Drawing on a review of thermal inactivation parameters by Wachnicka *et al.,* (2016) [58] the subgroup found evidence to recommend a change in the z-values within the range of 6.7-7.7°C for calculation of equivalent thermal processes below 90°C. If adopted, this would increase processing time at temperatures below 90°C, required to achieve an equivalent process of 90°C for 10 mins.

27. Concerning challenge testing, the subgroup agreed that absence of toxin is a minimum requirement for safety and that measuring growth does provide useful additional evidence, but expert advice should be sought as growth studies need careful interpretation. Mathematical modelling for *C. botulinum* usually concentrates on spore germination and on population growth and there are only a few examples that consider the production of toxin. Therefore, the subgroup advices that the inclusion of modelling into safety decision making should be conducted in collaboration with expert advice.

28. The group agreed that new evidence shows that, in principle, spore loading could contribute to risk assessment. However, it was agreed that this is a complex step, which requires a structured approach, and is not currently included in the guidelines.

29. The subgroup reviewed the report funded by the British Meat Processors Association (BMPA) and Meat Livestock Australia concerning three types of fresh meat: beef, lamb, and pork. Whilst the subgroup did not feel enough evidence was available to consider shelf lives around those demonstrated in the challenge

tests, it was agreed that an increase of the shelf life of these fresh meats from ten to thirteen days could be recommended, based on the safety record of current industrial practice.

30. The Committee noted that the conclusions were echoed in the recommendations that covered the following areas: ten-day rule in relation to fresh meat, z-values, challenge testing, upper shelf-life limit for foods with controlling factors in place and controlling factors. Other aspects of the review that the group discussed but felt there was insufficient evidence to inform any recommendations, or that were outside of the current scope of the guidance included: nitrites, hyper-oxygenated foods, other bacteria possessing botulinum neurotoxin (BoNT) genes, impact of resident microflora on *C. botulinum*, the original 1992 ACMSF report (the group discussed the report although it was outside of the scope of its remit to review it. A full review of the report was recommended) and detection of *C. botulinum* growth.

31. The group pointed out that it was extraordinary that relatively little work has been carried out on this organism and its toxin when considering its potential impact. It was added that the FSA may want to consider this observation in relation to any food safety review or when the 1992 report is reviewed.

32. Before inviting members to comment on the report the Committee Chair thanked the group for producing it within a short space of time.

33. The following comments were made by members.

- Very good/clear report with evidence clearly presented, particularly on the z-values recommendation. Group should be congratulated for a job well executed.

- Welcomed the group's recommendation on the support of a change in the FSA's guidelines on the ten-day rule in relation to fresh meat (lamb, beef, and pork) based on the available evidence (BMPA study and the FSS survey) although recognising that having a longer shelf-life would have been beneficial to the meat industry.

- A member commenting on the upper shelf-life limit for foods with controlling factors (on the recommendation that the maximum shelf-life of foods given a heat process of 90^{0}C for ten minutes (or equivalent) should be limited to 42 days, unless it can be shown that lysozyme is absent from the food), questioned whether the group discussed other evidence a producer might have in the event of meat containing lysozyme following heat process but the producer

being able to deliver a 6 log reduction in spores of *C. botulinum*. A member of the subgroup explained that the recommendation did not say that meat processors could not go beyond 42 days. He clarified that expert advice should be sought if a shelf-life in excess of 42 days is desired. It was underlined that meat processors (small as well as large business) who wish to go beyond 42 days should have robust evidence to demonstrate why they can do this. It was added that the group agreed with this cautious approach as there were many unknowns in this area.

- As there was a query on the group's prescriptive recommendation on challenge testing (mouse bioassay remains the gold standard for BoNT detection and other detection methods should demonstrate at least equivalent specificity and sensitivity), the group members clarified that they were not solely advocating the use of the mouse bioassay but were saying any alternative method should be as good as the mouse bioassay. It was added that the emphasis for this recommendation was concerning toxin detection for the organism and the need to be precise in the statements being made in the report.

- A member of the subgroup drew attention to line 622 in the report (detection of *C. botulinum* growth): he indicated that "statistical" should be inserted before "power".

34. In conclusion, following the discussion of the evidence and the recommendations, the Committee unanimously approved the report and agreed to all the recommendations.

35. In the section of the plenary meeting opened to the public, Dr Kaarin Goodburn (Chilled Foods Association) welcomed the group's report, particularly the recommendation for the ACMSF to consider conducting a full review of the ACMSF 1992 report on vacuum packaging and associated processes which she underlined was overdue. She pointed out that it had taken more than 2 years to get to this point highlighting the difficulties the 1992 report and the FSA 2017 guidance have been causing industry. Specific questions Dr Goodburn raised were:

- "When will the FSA revise its 2017 guidance which she said was unsafe in certain respects, without scientific justification and detrimental to trade. She was informed that her query would be passed to FSA risk managers who would consider the assessment that has been carried out by ACMSF. It was explained that FSA risk managers have a systematic approach in considering ACMSF's assessment of issues.

- ‘Entirely safe’: Line 511 of the subgroup’s report includes the clause ‘it is not possible to provide a measurement and therefore critical limit that could be applied to assess whether fresh, chilled meat is entirely safe.’ Does the subgroup recognise that there is no such thing as total absence of risk, hence Food Safety Objective play a role? Terminology regarding risk has been agreed in paper ACM/1334 (ACMSF report on multidimensional representation of risks) so should be used. A level of protection for fresh meat with respect to non-proteolytic *Clostridium botulinum* in the UK has been determined to be $10^{10.8}$ (MLA/BMPA report) and earlier as $10^{9.8}$ in the 2006 FSA-commissioned report from IFR/Campden/Goodburn that was endorsed by ACMSF. At those levels of protection the correct terminology would be ‘negligible’.

- 42 days max shelf life for 90/10 foods unless lysozyme absent (or expert advice taken) is based on work using an initial inoculum of 10^6 spores/ml (Fernandez & Peck), which does not reflect levels found in reality. How has this been taken into account by the subgroup?

- 13 days proposed max shelf life for VP/MAP fresh meat - what is the scientific basis for this given that two risk assessments covering hygiene and shelf-life practices, trade and consumption safety internationally substantiate the current shelf lives applied by UK industry? What additional data would be required to change this, noting that the UK is globally unique in issuing guidance stipulating shelf-life rules for these foods, so creating a technical barrier to trade.

- Will the UK be enforcing the 2017 guidance on imports or only on UK industry?”

36. David Lindars (BMPA) supported the comments made by Dr Goodburn (CFA). Drawing attention to the proposed shelf-life extension (ten to thirteen days) for lamb, beef and pork, “he remarked that despite the evidence available to the group he was surprised with the recommendation which he felt was prescriptive and overcautious. He said industry’s risk assessments and challenge testing have demonstrated that shelf-life can be extended to up to 28 days and that industry would struggle to work with this proposal. He mentioned that industry would like a proposal that would favour trade as the meat industry was going through a tough time with consumption of meat going down.” Other points he made were that the report will hinder the exportation of retail packed meat bearing in mind transportation/shipping and it may contribute to food waste.

37. The chair of the subgroup (Prof McDowell) commented that as ACMSF is an evidence-based body the availability of evidence is what guides the Committee in

the opinions or reports it produces. He stated that the group's recommendations were supported by the evidence they considered. He reminded industry representatives that when he was ACMSF Interim Chair he encouraged industry to make available all the evidence they have on this subject as this was how any change of assessment could be made. A member of the group advised industry representatives to read the group's report carefully as the group did not say it was not possible to go beyond 13 days (page 14, line 520 refers: "Challenge test data does show that there is potential for the shelf-life to be extended further but this would need additional evidence to encompass the potential variation between and within the meat species studied by the BMPA". He underlined that the group in its deliberations received no evidence to allow a recommendation of more than 13 days to made. He clarified that the recommendation did not rule out a shelf-life of beyond 13 days provided that the food business operator has sufficient evidence to support it. David Lindars commented that the risk assessment presented to the subgroup had enough material/data which industry felt would convince the group. He underlined his disappointment on the group's shelf-life extension decision.

38. On the question, of the FSA's timetable in responding to the report, Dr Paul Cook (ACMSF Scientific Secretary) confirmed that with the approval of the report it would now be for FSA risk managers to decide on the next steps. They will decide on possible changes as a result of the recommendations. Industry representatives were advised to direct any queries they may have to risk managers as they will have precise advice on timelines.

Review of the ACMSF report on vacuum packaging and associated processes

39. One of the key recommendations of the subgroup on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged food was to review the Committee's 1992 report on "Vacuum Packaging and Associated Processes". At the October plenary meeting, Dr Iulia Gherman presented paper ACM/1339 (Review of the ACMSF report on vacuum packaging and associated processes) that asked members to discuss the above recommendation and identify priority areas that a review should cover. Dr Gherman reported that the 1992 report was the initial evidence base for the FSA's guidance on vacuum packaged (VP) and modified atmosphere packaged (MAP) chilled foods. The FSA's guidance fixed the

maximum shelf life of these products to ten days unless there are other controlling factors in place. This FSA guidance was revised in 2017 to improve clarity, with the evidence base remaining the same.

40. It was highlighted that the subgroup on non-proteolytic *C. botulinum* and VP/MAP foods reviewed evidence provided by the British Meat Processors' Association and Meat Livestock Australia on the shelf life of beef, pork, and lamb with respect to C. botulinum risk. The group concluded that there was evidence that the shelf life of VP/MAP fresh beef, pork and lamb could be extended to thirteen days, and that the ACMSF should consider reviewing the 1992 report. It was noted that the subgroup discussed elements of the 1992 ACMSF report during the course of its work although it was outside of the scope of the subgroup to review the document in full.

41. The Committee was informed that FSA Policy has setup a working group with industry representation to discuss updating the FSA guidance on VP/MAP foods. This working group is expected to conduct an international review of legislation and guidance related to VP/MAP chilled fresh beef, lamb, and pork, to determine whether the UK is unique in having specific guidance for such VP/MAP fresh meat. The FSA also launched a consultation on its guidance.

42. Dr Gherman stated that given the time that has passed since the publication of the 1992 ACMSF report, the additional scientific evidence available and the introduction of new technology for VP and MAP foods, it was important to review the evidence on VP and MAP processes as recommended by the Committee's subgroup. Members were invited to discuss risk assessment issues that are relevant for inclusion in a review of VP and associated processes. Dr Gherman mentioned that a proposal to set up an ACMSF subgroup to carry out the review will require a statement from FSA Policy, which will set out the issues of interest to them.

43. Members were invited to comment on the following specific questions from the FSA:

- Consider what topics are likely to be of importance in a review of vacuum packaged foods and other associated processes, including the processes, types of food and the microorganisms of concern.
- Identify the priority issues for a future working group to address.
- Comment on areas that should not be covered in this review.

- Provide some initial suggestion as to how the work might be addressed from a risk assessment perspective and where additional evidence might be needed to support this work.

44. The following comments were made by members:

- Observing that there is presently no hazard analysis and critical control points flow chart to highlight the critical control points for the production process for vacuum and modified atmosphere packaged foods, a member suggested that the group that will be setup to review the 1992 report should consider designing a complete HACCP flow chart that will look at the potential risk at the critical control points of the production process. The critical points should be earmarked for risk assessment as this would be useful for risk managers to understand the relative risk at the critical control points.

- Highlighting that the approach taken by the authors of the 1992 report was to look at risk associated with vacuum and modified atmosphere packaged foods, a member felt the Committee should consider putting more emphasis on the organism. Focussing the assessment on the risk of botulism from refrigerated vacuum packed and modified atmosphere packed food would emphasise the need to examine the risk associated with the organism and the product rather than the production process. It was explained that the Committee/subgroup should avoid framing the assessment from a process perspective but seek to consider the risk assessment in a structured way such as looking at the disease, evidence of botulism from non-proteolytic C. botulinum, levels that cause disease, risk factors and foods associated with this organism etc.

- The above point was underlined by another member stating that looking specifically at the organism within the food group should be the way forward rather than looking generally at the food group. He also commented that other species of *Clostridium* known to produce botulinum toxin should be included in the review not restricting the risk assessment to *C. botulinum*.

- Supporting the suggestion that the focus of the review should be *Clostridium* species known to produce toxins, a member added that if the group looks at other pathogens it should use risk ranking in shortlisting the organism to assess.

- There was caution that any review of the 1992 report should not reinvent the wheel on the evidence base for the rules governing the production of vacuum and modified atmosphere products as the original guidance based on the 1992

report has worked well for food business operators. It was underlined that the review should recognise the volume of foods that are subject to the FSA guidance on the prevention of hazard from VP and MAP foods and be mindful of the implications of the outcome of the proposed review.

- Echoing the above point on the usefulness of the 1992 report, members noted that report has been very accessible to food enforcement officers when advising small and big food business operators. The flexibility it provides big business was emphasised.

- Appreciating the need not to reinvent the wheel, a member commented that as technologies have changed since the publication of the 1992 report, assessing the impact of these technologies in controlling pathogens would be relevant for the review. Also mentioned for consideration were plastics and the different packaging materials currently used for VP and MAP packed foods. The issue of whether these materials were conducive to biofilms and other risk factors was raised.

- Concerning the point on new technologies presently used for producing VP and MAP products, members were reminded that the subgroup on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged food considered this in the course of producing their report. This point was specifically raised with the BMPA when they provided the subgroup with evidence. It was also mentioned that the subgroup was provided with robust up to date literature review to support the group's work.

- A member drew the Committee's attention to the distinction between VP and MAP processes used for foods as he felt the terms were being used interchangeably without distinguishing that these two processes were not the same. It was suggested that the review may want to consider using the terms "low oxygen and zero oxygen" packed foods in their deliberations. It was added that technology and producers of these foods have moved on since the publication of the 1992 report.

- As there is presently the movement away from nitrite/low nitrite in foods that traditionally had nitrites in them, it was suggested that the issue of nitrites in foods should be a key feature in the review. It was noted that the subgroup on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged food did not have time to look at this area in detail.

- The review should consider the subject of “history of safe use” as several products that are affected by the current rules and possibly the proposed review will fall under this category.

- Review should revisit the issue of upper shelf-life limit for foods with controlling factors (the recommendation that the maximum shelf-life of foods given a heat process of 90^{0}C for ten minutes (or equivalent) should be limited to 42 days, unless it can be shown that lysozyme is absent from the food). The member who raised this point felt re-examining the issue of lysozyme in foods was important as the recommendation in the subgroup’s report (published in January 2020) could be mis-interpreted.

- Chapter 5 in the 1992 report should not be included in the review as it is risk management.

- It was highlighted that when the subgroup on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged food considered BMPA’s risk assessment of botulism from chilled, VP/MAP fresh meat held at 3°C to 8°C, it was noted that evidence in this area was sparse. There was the suggestion for the FSA and probably in collaboration with other funders consider funding research in this area to provide further evidence to inform risk assessment.

- A key output from the proposed review/risk assessment should be an estimate of risk comparative to risks from other foodborne pathogens that consumers are exposed to in food. It was added that controls for non-proteolytic *C. botulinum* in food appear to be placed at a level that is not commensurate with the risk it presents. The ACMSF’s recently published report on multidimensional representation of risks was mentioned as a tool that may help address this point.

- ACMSF Scientific Secretary raised the issue of whether any ambient foods/products should be considered in the proposed review. Following discussion, it was agreed that this was too broad and an entirely different subject to be included in the review. However, it was agreed that the need to consider this area could be mentioned in the appendix of the report produced by the proposed subgroup.

45. In conclusion, the Committee chair thanked members for their comments on the proposed review of the 1992 report on “Vacuum Packaging and Associated Processes”.

46. In the section of the plenary meeting opened to the public, Dr Kaarin Goodburn (CFA) made the following points on paper ACM/1339 (Review of the

ACMSF report on vacuum packaging and associated processes). “She explained that the review of the 1992 original ACMSF report did not convey any of the substantial fundamental and applied research, best production practice development or guidance work done in the 28 years since its publication. This work has been referred to numerous times in the Committee, particularly since publication of FSA’s guidance. It is notable that the UK is the only country which has such guidance, and that fresh meat was intentionally not referred to in previous guidance including that published by FSA in 2008 since its safe consumption was known of for many decades yet research had not been done at that point to determine what the factors were. Major publicly and privately funded projects have since been done (e.g., SUSSLE AFM266, Barker *et al.* (AEM Jan 2016), MLA/BMPA (2019), Peck *et al.* (Food Micro 2020)) showing that fresh meat has the lowest spore loading of any food material, by several magnitudes, and coupled with standard abattoir, subsequent processing, and handling measures (e.g., CODEX, 853/2004, industry standards) has assured safety internationally. No other country limits the shelf life of foods in this way, creating technical barriers to trade, food waste, and the moral issue of killing sentient beings for their meat yet disposing of it on an arbitrary basis.”

47. David Lindars (BMPA) echoed comments made by Dr Goodburn (CFA) on the review of the ACMSF’s 1992 report on vacuum packaging and associated processes and the point a Committee member made on how to approach the review of the report (paragraph 7.6 bullet 2 refers).

Tickborne Encephalitis virus risks to public health

48. At the October plenary meeting, Dr Anthony Wilson presented the Committee with paper ACM/1323: Tick-borne encephalitis virus - draft risk assessment in relation to food for discussion. He reported that following the first ever detection of TBEV in the UK in 2019, an opinion was requested from the FSA by the Department of Health and Social Care (DHSC) and the Chief Medical Officer (CMO) on the risk to the public of infection with TBEV via the consumption of unpasteurised dairy products or of rare or undercooked meat from potentially infected animals in those areas where the virus had been detected in ticks. He highlighted that the risk assessment estimated that the overall risk from consuming rare or undercooked meat or drinking raw drinking milk (RDM) produced in the two affected areas was very low to low with a medium level of uncertainty and noted that the overall risk of TBEV via all foodborne pathways in

the two affected areas was likely to be significantly lower than the risk from a tick bite.

49. Members noted that this was the first risk assessment to go through ACMSF using the newly adopted 2-dimensional risk assessment framework.

50. The Committee was invited to comment on the risk assessment via specific questions. Members made the following comments:

- Exposure Assessment. Assessment 1 (frequency of occurrence): Very low (very rare but cannot be excluded): a member remarked that this should be “low” because of the level of uncertainty in the material/data used for the assessment. Dr Wilson and another member noted that this was reflected in the assessment of uncertainty, as recommended under the newly adopted risk assessment framework.

- The member also queried the hazard identification narrative in paragraph 3 of the risk assessment, highlighting the non-inclusion of the number of counties that blood samples were collected and the lack of information to confirm if comparisons were carried out in all the counties sampled. Dr Wilson referred to paragraph 1 of ACM/1323 and elsewhere in the summary and exposure assessment where it is stated that the risk question requested an assessment of the risk limited to the two specific areas. He explained that the risk assessment was looking at the risk to consumers of rare or undercooked meat and consumers of RDM produced in the two areas.

- Exposure assessment (paragraph 10) was also queried as it was felt the information provided relating to the Food Business Operators who produce RDM in the regions of interest was inadequate. Dr Wilson clarified that this was based on information available when the rapid risk assessment was requested but agreed that additional information would have been helpful.

- As Dr Wilson clarified that the risk question (and resulting risk assessment) on this occasion was specifically for two areas not for the whole of the UK, a member suggested mentioning more prominently that the assessment was for 2 areas which are only part of potential population at risk in the UK.

- With regards to foraging of pigs that take place in one of the areas covered in the risk assessment, a member raised the question of whether there were risks in consuming pork from that area. Dr Wilson confirmed that there was no indication in literature of pigs being infected by this virus. He cited information in the risk assessment that covered the prevalence and incidence of TBEV in farmed

livestock.

- A point of clarification was raised on page 1 (paragraph 2) that indicated that the current ACMSF classification of overall microbiological risk from RDM is low. This will be corrected to “medium” not “low” in any future versions of the RA.

- A member acknowledging the difficulty of carrying out risk assessments when there is limited quantitative and qualitative data suggested a relook at how uncertainty has been expressed in the risk assessment (uncertainty was expressed for occurrence and detriment). He indicated that given that as uncertainty has been expressed in severity of detriment, and uncertainty expressed in ingestion as a route of infection, uncertainty should be expressed for risk characterisation which should be high because of the high level of exposure. Dr Wilson noted that it is currently reflected in the remark addressing the level of confidence, doubt and caution around the science underlying the assessment of risk, as recommended under the new structure.

- Clarification was requested on exposure to the population in relation to whether clinical surveillance of livestock could be used to identify infected animals and their products getting into the food chain. Members were referred to paragraph 13 of the risk assessment that stated that infection of TBEV in cattle, sheep and goats is often subclinical meaning animal inspections are not an effective method of detecting infection.

- Paragraph 11 statement that high-temperature, short-time pasteurisation should be highly effective at inactivating TBEV was queried. It was suggested that other pasteurisation protocols may also fulfil the requirement for reducing infection. It was underlined that clarity on the effectiveness of other methods of pasteurisation would be helpful to big and small producers of RDM to mitigate against infection.

- The issue of potential impact of climate change on the transmission risk of TBEV was raised in the context of whether this may change tick population development processes and TBEV transmission dynamics. Dr Wilson agreed but noted that the risk assessment under consideration was formulated in response to a very specific risk question about the immediate risk from two specific areas and this is why this was not discussed.

- Given that this is an emerging/evolving situation with limited data to produce a robust risk assessment probably it would be sensible to mark this

subject for revisiting in future when more data are available, potentially covering a broader geographical area and a longer time period.

- Noting the very limited availability of UK data to inform a robust UK-wide risk assessment, a member enquired whether it would be possible to extrapolate more specifically from quantitative data obtained from European countries (bearing in mind population size) where TBEV is more established to produce an assessment in relation to RDM? It was confirmed that it is not possible to extrapolate data from other countries on tick population and TBEV infection rates because both are known to vary substantially over very short distances and are affected by complex interactions with many aspects of the local microenvironment.

- Defra Departmental representative shared that HAIRS risk support group recently discussed TBEV and may have published a risk assessment. Risk assessment was shared with the Committee.

- The chair of the subgroup that produced the Committee's newly adopted framework on risk representation commended the author on how the document was drafted.

51. In conclusion the Committee chair thanked members for their comments on the draft risk assessment.

52. At a subsequent plenary meeting, a member mentioned that although she was satisfied with the outcome of the discussion the Committee had on the risk assessment, she would like the author of the risk assessment to categorise the section relating to raw drinking milk as "high uncertainty" as the paper is unclear on the number of people that drank raw milk in the 2 specified areas covered in the risk assessment.

53. The secretariat was also asked to draw the author's attention to a point raised on the risk assessment regarding the current ACMSF classification of overall microbiological risk from raw drinking milk (page 1: paragraph 2). This should be corrected to "medium" not "low".

Update on estimates of norovirus burden

54. Dr Anthony Wilson updated the Committee on the FSA-funded Norovirus Attribution Study (NoVAS) that estimated the contribution made by the food chain to the burden of norovirus infection in the UK. The study was commissioned to

help to address some of the recommendations made by the Committee in its 2015 report on viruses in the food-chain. The overarching aims were to investigate: How much norovirus is transmitted through contaminated food? What is the role of infected food handlers in transmission? Is it possible to differentiate between infectious and non-infectious virus in a variety of food matrices? The presentation gave an overview of the study's general project structure: Work package (WP) 1: Systematic literature review of foodborne and food-handler-associated norovirus outbreaks, to identify pathways, WP2: Diagnosis development, WP3: Survey of norovirus contamination of retail oysters, WP4: Fresh produce (raspberries and lettuce), WP5: Norovirus in commercial food preparation environments, WP6: Quantitative microbiological risk assessment.

55. Members noted the details of the model exposure and risk models used for WP6: QMRA (a model for estimating the risk of norovirus infection via lettuce, oysters, raspberries, catering and takeaway), the quality assurance of models for use by government (as recommended in the Aqua Book) and study's key results.

56. Report finding (foodborne pathways) revealed that: the Norovirus Attribution Study (NoVAS) suggests that food is likely to be responsible for a higher proportion of the 3 million annual UK norovirus cases than previously thought, although person-to-person transmission remains the most common cause. The FSA has also conducted a detailed technical review of the model developed in the study which updated several parameters to represent the best data now available.

o Commercial catering operations, including takeaways and restaurants, were found likely to be responsible for a majority of foodborne norovirus;

o Lettuce sold at retail is estimated to account for 16-30% of all foodborne norovirus cases, and other fresh produce (fresh and frozen) for 6-7%;

o Although oysters also represented a 3% share, they present the highest risk per individual serving.

57. Report finding (foodborne norovirus and total norovirus) revealed that: the estimated median number of foodborne norovirus cases in the UK per year increases from an estimated 78,000 cases of illness (previous 2009 estimate) to an average of 382,000 cases now using the parameters revised by the FSA.

58. This suggests foodborne norovirus accounts for around 12% of all norovirus cases in the UK each year. This figure is in line with estimates from other countries, including Netherlands at 17%, Canada at 18%, Australia at 18%, and

USA at 26%. This does not mean more people are getting unwell, but that food is responsible for more of the existing burden.

59. Members noted that the report will reinforce (in risk management communication message) the vital importance to both consumers and food business operators of good food hygiene and practices at all times, as well as highlighting the significance of a strong and effective Food Hygiene Ratings Scheme.

60. The Committee discussed the study findings in closed session.

Areas of Research Interest

61. Paper ACM/1325 concerning the FSA's proposed Areas of Research Interest (ARI) had been circulated to members. The FSA Scientific Advisory Committees were asked to consider and feedback on FSA areas of research interest research questions formulated by the Chief Scientific Advisor's team. Members were asked to review and comment on whether the questions fully reflect R&D needs in the area of microbiological safety of food. Elena Fesenko (FSA) provided a brief overview of her paper and asked members to review the FSA's ARI draft document (ACM/1325 annex A) drawing members attention to the following questions for comments.

o Has the CSA team captured all questions the FSA needs to answer – is there anything missing?

o Has the CSA team included questions that the FSA is not really interested in – are there any redundant questions?

o Are any of the questions worded in a way that misrepresents the issue – has the CSA team phrased anything wrongly?

62. In addition, members were asked if there were any changes that should be made to reflect the work of ACMSF.

63. The chair asked members to send written comments by 21 February 2020. The FSA is expected to have finalised their document by 31 March 2020.

STEC Research in Scotland

64. Dr Marianne James, Food Standards Scotland (FSS) gave a presentation on Shiga toxin-producing *E. coli* (STEC) research in Scotland. She reported that since

FSS was established in April 2015 understanding the transmission of STEC has been one of its research priorities. It was noted that Scotland has consistently had a high rate of STEC in the UK. Dr James's presentation covered the following areas:

- Clinical STEC infection (rate of reported STEC O157 infections in the UK)
- Scottish cases of STEC infection April 2000 – March 2018
- Notable recent outbreaks of STEC in Scotland
- FSS Research programme on STEC

Theme 1 – Understanding the source

- *E. coli* O157 super-shedding in cattle and mitigation of human risk

Theme 2 – Understanding STEC risks in the food chain

- Internalisation of STEC into plant tissue
- Control of pathogens in the production of raw milk cheese
- Risk of STEC contamination in wild venison
- Survey of the microbiological quality of beef mince on retail sale in Scotland

Theme 3 – Understanding the epidemiology of STEC in Scotland

- Diversity of clinical non-O157 STEC
- Molecular risk assessment of non-O157 infection
- STEC: Estimating the burden of gastrointestinal infection in Scotland using data linkage

- Evidence gaps
- Issues for industry and regulators

65. The Committee was invited to comment and propose any further evidence and information gaps for consideration for funding further research.

66. The following comments were made:

- Excellent presentation with interesting data that has filled some of the gaps on STEC.

- Impressed with the approach employed to investigate the diversity of clinical non-O157 STEC via the sequencing of archived isolates and carrying out molecular risk assessment supported by categorisation, as proposed by the joint FAO/WHO expert group on STEC.

- Referring to the phrase pathogenic potential used in relation to the above study, a member flagged the term “zoonotic potential” and probed whether FSS was following the route of using machine learning techniques turning molecular techniques into a pathogenic response. It was noted that the Roslin Institute was looking at this for FSS in relation to pathogenic potential in humans rather zoonotic potential.

- Consider looking at pork and pork products as they may be an unrecognised risk. Particularly test for non-O157 species as these were found in pork sausages and minced pork meat in a survey of these products in Canada.

- Fascinating data from the survey of GB farms. Did you calibrate it down to farms in the North of England and how these will compare to Scotland? It was noted that although some of this information was collected in confidence, FSS confirmed that they know the location of the farms should they need to carry out further research in particular areas.

- In terms of the highlighted projects members noted that the survey reports have data on regional differences.

- On the question of whether the studies collected data on cattle movement/cattle sales, it was confirmed that having this information would be useful in relation to data on genotype circulation.

- Did FSS look at AMR in circulation in relation to the different cohorts. Members noted that FSS had two studies that tested for AMR in non-O157 STEC.

- Are there any plans to look at the third part of the One Health triangle (the environment) and its role in the spread of STEC in the food chain; looking at its contribution in fresh produce. Members noted that studies in the Republic of Ireland have revealed the environment’s STEC contribution to the food chain. Dr James confirmed that FSS had no plan to include the environment in its surveillance programme as water and soil are not in their remit. She indicated that FSS could consider collaborating with Scottish Environment in this area. The

ACMSF member offered to provide relevant material on Republic of Ireland's STEC environmental work FSS might find useful. Action.

- Regarding super-shedders and risk mitigation, FSS appears to be focussing on a vaccine which is great. Is the plan only to use the vaccine to control super-shedders or were they thinking of other measures? Dr James confirmed that a multiple risk mitigation approach was the sensible way forward for the control of STEC (super-shedders). It was confirmed that the vaccine mentioned in the presentation is for O157 only not for all of the STECs. FSS presently do not have a strategic plan on how to control all the STECs on farms.

- Has FSS got plans of how the vaccines will be used by farmers and will they pay for vaccination? Dr James confirmed that there is a lot of positivity among farmers on the development of this vaccine. A member shared that a commercial vaccine produced in North America (about 10 years ago?) did not get a good up take. The point of having strong economic drivers and a robust social science assessment before producing a vaccine was underlined.

- Defra representative commented that following a recent outbreak of *Salmonella* in Sheep a study is being designed to look at the prevalence of *Salmonella* in sheep in England and Wales (sampling caecal contents at abattoirs). He offered to check if study will cover *E. coli*. He added that if *E. coli* is included in the study this will be another source of data for FSS.

- A member discussed the point of how *E. coli* has been used as an indicator for STEC over the years. He provided reasons why this should no longer be the case.

- Reference was made to a study in the United States where comparison of shedding levels was made looking at the effect of feeding cattle with grain in winter when they were in doors and fed on grass in summer when they were outdoors. It was suggested that diet and seasonal trends should be considered in surveys/studies in relation to STEC.

- Whole genome sequencing was acknowledged to be great but its effectiveness is related to the sampling isolation method. It was explained that selective media can influence the isolation process which can bring biases at the molecular analysis stage. It was noted that Scottish *E. coli* O157 reference laboratory was aware of this.

- A member referring a study (to be carried out by Public Health Scotland) that will estimate the burden of clinical STEC and determine risk factors and

clinical outcomes (STEC: Estimating the burden of gastrointestinal infection in Scotland using data linkage) asked whether FSS/PHS's way of understanding burden of disease compared with other large well known longitudinal studies such as the UK Infectious Intestinal Disease studies?

- Defra representative mentioned an APHA study that looked at the dynamics of *E. coli* in cattle herds and super-shedders. He offered to send copy of study report to FSS.

67. In conclusion, the chair thanked Dr James for her excellent presentation. He added that the Committee was amenable to be updated on the findings of the ongoing studies when the reports are published.

68. In the section of the plenary meeting opened to the public, Mr Lindars (BMPA) asked for clarification on the issue of vaccine mentioned in relation to super-shedders to mitigate against STEC and questioned whether vaccinated animals would be eligible for export (how would the EU for example perceive STEC vaccinated cattle?). Mr Lindars was advised to raise this with the Defra/FSA Trade Team.

Food and You Survey: Wave 5 Findings

69. ACMSF is usually presented with findings from the FSA's Food and You surveys (the Agency's flagship consumer survey measuring self-reported attitudes, behaviour and knowledge regarding food safety and other food-related issues). Lucy King and Richard Bridge (FSA) gave a presentation (via paper ACM/1324) on Wave 5 Food and You fieldwork. The survey was conducted by NatCen between June and December 2018. The total achieved sample size was 3,069 (2,066 in England, 536 in Wales and 467 in Northern Ireland) with a response rate of 48%. Combined results for England, Wales and Northern Ireland based on the core sample were published in April 2019. Subsequent reports presenting country comparisons, and country-specific data for Wales, and Northern Ireland (including a module on healthy eating) based on the boosted and reserve samples were published between May and July 2019. The presentation covered the following:

- Cooking and shopping patterns

- Eating patterns, Measuring food safety knowledge and behaviour: the index of recommended practice (IRP)

- IRP scores
- Cleanliness
- Cooking and reheating food
- Chilling and defrosting food
- Avoiding cross-contamination
- Use-by dates
- Food poisoning
- Information on food safety
- Eating out and the Food Hygiene Rating Scheme
- Food allergies and intolerances
- Measuring food security
- Food security
- Trust in food and in the FSA

70. Other areas covered include:

- How are the findings used within the FSA: Monitor progress towards the FSA's strategic outcomes, data feeds into the FSA's annual report and accounts, identify vulnerable groups to help in message targeting, inform content of public awareness campaigns and identify key or emerging issues where further action/research may be required.

- How are the findings are used outside the FSA: The findings are also used by Defra (extracting data collected on food security), Public Health Wales (for its Obesity in Wales report), National Food Strategy (some of the metrics are used in food security and trust in food) and the Office for National Statistics (in the development of its Sustainable Development Goals).

- Food and You 2: It was noted that the FSA will be launching a new Food and You survey ('Food and You 2') which will move away from traditional face-to-face interviewing towards a 'push-to-web' methodology (online survey with a paper follow-up). This new methodology will be more cost-effective allowing the FSA to increase sample sizes in Northern Ireland and Wales to 1,000 households

(500 in Wave 5) and the overall sample size to 4,000 households (3,000 in Wave 5). Unlike in previous waves, up to two adults in each household will be invited to participate and it is anticipated that the overall sample size will be c5,600 adults.

71. Members made the following comments on the presentation:

- How do you carry out comparisons in the findings from traditional face to face surveys and the online survey? It was confirmed that this won't be necessary as Food and You is completely moving from face-to-face surveys to the push-to-web methodology. In the discussion on the merits of online surveys one of its key advantages was that respondents when completing questionnaires were less likely to respond in a 'socially desirable' manner resulting in more accurate data being collected.

- It was acknowledged that the findings in the survey regarding hand washing was similar to what was found in male and female clinical staff in hospitals. Women were found to be more rigorous than males in adhering to hand washing.

- From the findings of the survey the issue of whether young males in University being targeted as at-risk group was raised. It was confirmed that although Food and You has risk groups such as the elderly, people who are not food secure etc. the FSA has ongoing work on consumer segmentation mining the Food and You database breaking consumers down to specific groups looking at where they get information from on food safety. The aim is to identify which groups are most at risk and devising the appropriate means to target them with food safety/food hygiene advice.

- On cooking and reheating of food it was highlighted that the percentage highlighted for pork shows this is an area that needs attention because under cooked pork is the most common cause of hepatitis E.

- Is there scope for Food and You 2 to have a question on whether consumers eat risky foods such as unpasteurised milk (raw drinking milk) and rare burger?

- Why does the online survey allow up to two adults in each household to participate in the survey. It was explained that the successful contractor proposed this approach as it was cost effective, uncomplicated and provides inter house comparability. It was noted that the questionnaire to the individuals will be given to them separately and they will have unique log in codes.

- In the hand washing questions do you differentiate between rinse hands under water and wash hands with soap. This point was noted for the questions that will go into Food and You 2 questionnaire.

- Are you going to spend more time with the at-risk groups who may struggle with the questionnaire? Point was noted (looking at carrying out specific research on at-risk and vulnerable groups). In the process of designing questionnaire with Defra

- If vulnerable people are in the food security category, they won't have computers. Web based survey should go the extra mile to get responses from this group.

- How far are you aiming to go with the data from this survey as some of the generated data are very revealing for some of the consumer groups. Social Science Team are in the process of employing a research fellow to analyse the data particularly to tease out some of the drivers behind the behaviours.

- On the question of the integrity of the demography of the survey (so as to ensure a good representative mix of the population), it was confirmed that Food and You 2 will employ a stratified sampling approach which will use indices of multiple deprivation.

- Noted the confidence consumers have on the Food Hygiene Rating Scheme. Recognition was higher in Wales and Northern Ireland (94%) than in England (86%). It was mentioned that consumers in England would welcome the scheme to be mandatory in England.

72. As it was highlighted that the questions for the questionnaire were presently being drafted, members were assured that the finalised questions will be shared with the Committee before they go live.

Epidemiology of Foodborne Infections Group

73. Dr Paul Cook updated the Committee on the activities of EFIG. His update covered the following trends in animal and human infection: *Salmonella* incidents in feed, *Salmonella* National Control Programme (NCP) results and food surveillance activities in England and Scotland. Highlights of the report include:

74. Between January and December 2019, there were 1161 reports of *Salmonella* from livestock, which is 7% higher than during January – December 2018 (1090 reports) and 4% higher than during the equivalent period of 2017 (1116 reports).

75. Reports of *S*. Typhimurium fell by 6% compared with January – December 2018 (111 vs. 118 reports) but increased slightly compared with the equivalent period of 2017 (115 reports). The most common phage types were DT193 (25 reports; 23% of total *S.* Typhimurium reports), DT104 (19 reports; 17% of total *S*. Typhimurium reports) and U288 (16 reports; 15% of total S. Typhimurium reports).

76. Between January and June 2020, there were 417 reports of *Salmonella* from livestock, which is 22% lower than during January – June 2019 (538 reports) and 10% lower than during the equivalent period of 2018 (461 reports).

77. Reports of *S*. Typhimurium were almost identical to January – June 2019 (51 vs. 52 reports) but 11% higher than the equivalent period of 2018 (46 reports). The most common phage types were U288 (17 reports; 33% of total *S*. Typhimurium reports), DT193 (13 reports; 25% of total S. Typhimurium reports) and DT104 (10 reports; 20% of total *S*. Typhimurium reports).

78. An overview of the *Salmonella* NCP results showed 4-layer flocks with *Salmonella* Enteritidis (SE) in 2020 (January to June) compared to 16 in 2019. Three of the 4 SE flocks were identified by risk-based sampling of flocks with links to premises identified in 2019 and whole genome sequencing of the isolates have shown that they are in the same cluster.

79. There have been fewer broiler flocks with regulated serovars in the first two quarters of 2020 (2: Jan -June 2020; 17 Jan-Dec 2019). However, flocks with non-regulated serovars continue to increase (1084: Jan- June 2020; 1455: Jan-Dec 2019). These are largely feed-related serovars and this is probably due to the EU ban on the use of formaldehyde in feed early in 2018 and that industry have not improved controls to reduce cross-contamination of feed after processing.

80. Trends in human infection data for 2019 revealed:

- There were 9,723 reports of non-typhoidal *Salmonella* in the UK in 2019, a decrease on the 10,298 reported in 2018, decreasing the overall UK reporting rate from 15.5 in 2018 to 14.6 in 2019. A decrease in the reporting rate was seen in England and Northern Ireland, the reporting rate in Scotland remained the same and an increase was seen in Wales.

- Reports of *S*. Enteritidis decreased in the UK in 2019 compared to 2018; with a decrease of 131 cases. Decreases were seen in England and Wales and increases were seen in Scotland and Northern Ireland. The UK reporting rate decreased from 4.7 to 4.4 cases per 100,000 population.

- A decrease in the reporting rate of *S*. Typhimurium was seen in 2019 compared to 2018 with a decrease of 375 cases. A decrease in reporting rate was seen in England, Wales, and Scotland while the reporting rate remained the same in Northern Ireland.

- *S*. Enteritidis was the most commonly reported serovar across all constituent countries, comprising 31% of all reported *Salmonella* cases in the UK. Scotland reported a slightly larger proportion of *S*. Enteritidis cases compared to all *Salmonella* spp. reported (40%), compared to 23% in Wales, 30% in England and 38% in Northern Ireland. *S.* Typhimurium comprises 18% of all reported Salmonella cases in the UK, with proportions within constituent countries ranging from 12% in Wales to 21% in Northern Ireland. Together *S*. Enteritidis and *S*. Typhimurium constitute 49% of all non-typhoidal Salmonellae reported in the United Kingdom.

- The reporting rate for *Campylobacter* in the UK in 2019 of 99.8 per 100,000 was similar to that reported in 2018 of 99.0 per 100,000. The rate of reported *Campylobacter* infections in England and Wales has increased for a third year in a row. The rate decreased in Scotland in 2019. Northern Ireland continues to report rates lower than the rest of the United Kingdom (71.7 cases per 100,000 population).

- Reports of STEC O157 in the UK decreased from a rate of 1.3 cases per 100,000 population in 2018 to 1.1 cases per 100,000 population in 2019. Decreases were reported across all four countries. Serotype O26 is usually the most commonly reported non-O157 serogroup in the UK and was the most common in England and Northern Ireland in 2019 with 127 reports.

- In 2019, 57 foodborne outbreaks were reported in the UK compared to 49 reported in 2018. There were 1,440 affected individuals, 989 of which were laboratory confirmed, and 84 reported hospitalisations. There were 15 reported deaths, two associated with *Salmonella* outbreaks, one associated with a VTEC O157 outbreak and 12 with three *Listeria* monocytogenes outbreaks. Norovirus was the most commonly reported causative pathogen (16/57 reported outbreaks, 28%) followed by *Salmonella* (15/57, 26%). The majority of foodborne outbreaks occurred in the food service sector (31/57, 54%), followed by community (18/57, 32%).

81. Other items EFIG considered include: food surveillance in England and Scotland, impact of COVID-19 on the food chain and food surveillance figures, FSA antimicrobial activities in relation to the food chain and a presentation on the

burden of gastrointestinal disease in Scotland (*Salmonella* linkage data).

82. Members made the following comments:

- As the update highlighted the increase in the cases of non-regulated serovars due to the EU ban on the use of formaldehyde in feed, a member raised whether the Committee could be proactive and assess the impact of this ban in relation to the risk of *Salmonella* in the food chain. Although Dr Cook stated that the Advisory Committee on Animal Feedingstuffs advises (the FSA) on the safety and use of animal feeds and feeding practices, he agreed to take this query to the relevant unit in the FSA for consideration and provide feedback.

- Remain concerned on the reporting of the animal and human infections data as it is not clear if there is any connection in the presented data and if the changes in the trends have any significance.

- There does not seem to be much information in the update provided on NCP results for 2019 and 2020 (January to June 2020). The *Salmonella* in Livestock Production in GB 2019 report provided detailed information on *Salmonella* particularly on *Salmonella* Enteritidis (the biggest cause of human illness) that cases doubled in 2019. Information in the report on isolations of the most common serovars in livestock and people in GB 2019 was very useful. Having updates on the association between animal and human infections is relevant for the Committee and EFIG to see.

- It is unclear why animal infections data cover Great Britain and human infections data are UK-wide (is there a reason for this?). This makes it difficult to have a direct comparison on trends of infection between animals and humans in the 4 UK member countries. It would be useful for the secretariat to share EFIG's terms of reference with the Committee as this may provide clarification. Dr Cook confirmed that the terms of reference will be provided.

- Antibiotic-resistant Campylobacter, a member asked if there were available data of the poultry farms in the country where antibiotic-resistant *Campylobacter* were isolated (are there differences in the usage of antibiotics in the different farms in the country)? Dr Cook confirmed that the Veterinary Medicines Directorate collect data on antibiotics usage in the livestock sectors across the country which is published yearly via the UK Veterinary Antibiotic Resistance and Sales Surveillance Report. He underlined that recent reports have revealed substantial reduction of usage of antimicrobials in the production of food producing animals. Dr Cook agreed to check with VMD if they have information on

location of farms where data for antibiotic-resistant *Campylobacter* was available. Action. The member who raised this question remarked that it would be useful to have this information in relation to data being collected on erythromycin and ciprofloxacin resistance (antibiotics used to treat *Campylobacter* in humans).

- A member echoed the above statement on the significant reduction in the usage of antibiotics in food producing animals in all sectors. He commented on the ban concerning formaldehyde explaining that the ban by the EU was based on the safety of operators in feed mills not because of its use in feed for animals. He added that the alternatives to formaldehyde have not been as effective and are expensive.

- Defra representative commented that Animal and Health Plant Agency (APHA) in Weybridge were investigating/working on alternatives to formaldehyde. He agreed to share any relevant information with the Committee. . On the increase in the cases of *Salmonella* Enteritidis in 2019 (mentioned in the *Salmonella* in Livestock Report GB 2019), he informed members that this was due to a number of outbreaks that affected several holdings. Members noted that Public Health England (PHE) and APHA now routinely use whole genome sequencing in investigations and share resulting data on regulated serovars (*S*. Enteritidis and *S*. Typhimurium) to see if they matchup with human outbreaks.

- On the question raised on impact of Coronavirus and food processing plants, it was confirmed that as it was not a direct food safety issue, it was the responsibility of the Health and Safety Executive and PHE.

- A member expressed the difficulty he has in understanding the trends presented in EFIG updates. He explained not knowing the number of samples taken in any context made it was difficult to discern the trends in the respective years and draw meaningful conclusions. Dr Cook explained the challenge PHE and APHA face in how to present animal and human data in the format members will welcome. He indicated that there are ongoing discussions how to address the Committee’s observations on data presented in EFIG reports.

83. The chair thanked Dr Cook for his update.

COVID-19

84. At the January plenary meeting under any other business, a member raised the issue of Coronavirus in relation to the movement of food. He felt it would be appropriate for the FSA/ACMSF to be considering the potential risk of this virus to

the food chain. The chair indicated that he was aware of published work that has confirmed that this virus survives on common surfaces (plastics, ceramics etc) for between 3 to 4 days. He was unaware of any work that has been done on the virus in relation to food. Dr Cook remarked that there was an established mechanism to consider emerging issues such as referring it to the Committee's subgroup on Newly Emerging Pathogens. He referred to the current advice on the WHO and the NHS website. He mentioned that there was ongoing discussion in government on the impact of this virus and will update the Committee if there was any development that needs members attention/action although this may be via the Newly Emerging Pathogens Working Group.

85. Dr Kaarin Goodburn at the October plenary at the public question and answer section drew attention to paper ACM/1347 Fresh produce SARS-CoV-2 Risk Assessment highlighting that it does not reflect actual practice. "She explained that the document did not take into account that the use of sewage sludge was banned in relation to all RTE crops commercially in 1999, through the ADAS Safe Sludge Matrix, to which all water companies and major retailers (and their suppliers) signed up and have maintained ever since as a core requirement. However, the risk assessment assumed usage in strawberry production, which is incorrect and although not materially impacting on the overall risk assessed in this case, it could have, and it impacted on the level of uncertainty reported. It would be most appropriate to reflect actual practices if in such cases where standard/best risk management practice is being considered by the FSA's risk assessment team, that they contact the relevant industry body (i.e., the subject matter experts) to determine what procedures are, instead of simply doing some form of literature-based review. Such a review would not, as happened in this case, necessarily pick up this information."

Horizon Scanning Workshop

86. At the January meeting Dr Manisha Upadhyay (ACMSF scientific secretariat) via paper ACM/1327 updated the Committee on proposed horizon scanning workshop. Members were reminded that these workshops have been routine Committee business for many years and have played a key role in helping the Committee and FSA identify and respond to emerging microbiological food safety risks.

87. Following Dr Upadhyay's presentation and in response to her question (on whether members were content with the general format of previous workshops) members confirmed that they were happy to follow the format that has been used

in the past. A member commented that tangible outcomes have emerged from previous workshops. In response to how the questions for the workshop are generated, Dr Upadhyay explained that they come from themes/questions considered important by the FSA/ACMSF secretariat for the Committee to comment on them prior to the workshop and a full discussion is held on the day of the event where priorities are decided.

88. On how horizon scanning is defined in terms of time, it was highlighted that members may want to define this on this occasion. It was noted that presently 5 to 10 years appears to be the rule used for horizon scanning purposes.

Horizon scanning workshop - summary of discussions and outputs

89. The Committee's virtual horizon scanning workshop was held in June 2020. Dr Manisha Upadhyay introduced paper ACM/1338 that outlined the outputs from the workshop that followed a similar format to previous workshops with a mixture of breakout groups and plenary sessions. Dr Upadhyay explained that because the workshop was held in closed session it was the norm to provide an update in open session due to the Committee's commitment to openness and transparency. At the workshop, members identified emerging issues around a series of specific questions and agreed a prioritised list of recommendations that could be seen to have the greatest impact on reducing foodborne illness. Dr Upadhyay's report covered the priority emerging issues identified by members and the suggested possible actions. The specific questions to members were:

Q1- Can you identify any emerging issues that might present a risk to the public (COVID-19 related)?

Q2: Can you identify any emerging issues that might present a risk to the public (non-COVID-19 related)?

Q3: Are there any risks or opportunities associated with new food technologies not already considered by the ACMSF?

Q4: What do you view may be the main emerging issues, risks and opportunities following UK exit from the EU?

Q5: Is there anything else risk assessment related to bring to the FSA's attention?

90. Members were asked to note the outputs from the horizon scanning workshop and to indicate whether they were content to accept paper ACM/1338 as an accurate reflection of the horizon scanning workshop or whether there were

any final amendments to make or additional points to consider. Members were given the option to provide further comments electronically after the meeting.

91. Members welcomed the output of the workshop as presented in paper ACM/1338. It was agreed that the paper accurately reflected the discussion the Committee had at the workshop.

92. A member congratulated Dr Upadhyay and her team for running a successful workshop underlining that the output has been very well captured in the circulated paper. However, she asked for the next steps after the paper is published. She enquired on the possible timeline for the proposed actions. Dr Upadhyay confirmed that the FSA's newly developed risk analysis framework for all Scientific Advisory Committees will guide how the recommendations in the paper are progressed. The secretariat will meet with the relevant teams in the FSA that are the policy lead for the areas identified as priority issues to discuss how they might be progressed.

93. Supporting the above remarks on the fruitful discussion the Committee had, another member cautioned on the pace in following up on the highlighted actions. He stressed the need for rapid consideration of the priority recommendations, particularly the themes identified in relation to Covid-19. It was noted that not all the identified themes require urgent attention as a number of them can fall under the umbrella of a longer-term review. The secretariat agreed to provide a progress report at the next plenary meeting.

ACMSF Terms of Reference

94. ACMSF is an independent non-statutory body setup in 1990 on the recommendation of the Richmond Committee (Committee on the Microbiological Safety of Food, chaired by Sir Mark Richmond) to provide Government with independent advice on microbiological safety of food. Adekunle Adeoye (ACMSF admin secretariat) presented paper ACM/1321 that asked for members views on the Committee's original terms of reference. The paper also covered the Committee's ways of working and work programme development process. The terms of reference is:

"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."

95. Members made the following comments on the terms of reference (ToR).

- ToR appears to be vague on how issues should come to plenary meetings. There should be a clause in it to highlight there is a systematic approach in place used to decide when issues should be referred to the Committee, and to state where that approach is documented. Dr Paul Cook explained how the Committee's work programme operates. He added that as part of the FSA's newly developed risk analysis framework all Scientific Advisory Committees have a role in terms of how the process should work in practice. He underlined that this framework provides the basis for the FSA bringing issues to the Committee for consideration. It was noted that although not all issues come to ACMSF for consideration as some are dealt with in collaboration with other government departments, the framework makes provision for the Committee to sense check risk assessments relating to microbiological food safety.

- Although the ToR has served the Committee well over the years, a member questioned whether "microbial toxins" should be added to it.

- There was no objection to the suggestion that Defra should be added to one of the Departments ACMSF has close links with on issues relating to foodborne disease.

- Is commenting on risk assessments prepared by the FSA covered in the ToR? It may be prudent to explicitly highlight this function.

- An increasingly significant point for the Committee which is not explicit in the ToR or the Committee's role is the subject of when the hazard crosses the boundary from microbiological food safety into another area such as chemical food safety. It was pointed out that as ACMSF's focus is on microbiological food safety when there is a shared issue between microbiological and chemical food safety there is nothing to indicate when to make way for the chemical angle or how to combine or have a joint risk assessment for these two areas. The possibility of capturing this in the ToR in terms of food safety generally was flagged.

- As the current ToR has not hampered the Committee's operations over the years and the members have not struggled to carry out functions to advise the FSA, the Chair and Deputy Chair felt no amendment was needed. It was underlined that the phrase "any matters relating to the microbiological safety of food" in the ToR (see above) was sufficient to capture any microbiological issue that may not appear to be covered in the ToR.

96. The chair thanked members for comments made on the ToR. The secretariat noted that there was no objection from members to the above comments from the Chair and Deputy Chair that the ToR has been serving the Committee well in the carrying out of its functions (bullet point 5). Therefore, no further action or changes would be made to the Terms of Reference at this time.

ACMSF Ad Hoc and Working Groups

Ad Hoc Group on Quaternary Ammonium Compounds (QACs) and Biocides used in Food Processing

97. Dr Gary Barker (chair of the above group) updated members that the subgroup last met in January 2019 (update was provided at the January 2020 plenary meeting). He stated that he has been keeping in touch with the expert Committee on Pesticides Residue in Food on relevant updates on maximum residue levels in relation to QACs and Biocides. He reported that the UK did not attend the European Commission's Standing Committee on Plants, Animals, Food and Feed meeting that took place in November 2019. Members noted that SCOPAFF voted on maximum residue levels (MRLs) for Chlorates in February 2020 (ACMSF QACs and Biocides subgroup contributed to the EU consultation on Chlorates MRLs). SCOPAFF has been gathering data on QACs used as disinfectant with a view to make a decision on possible changes to the current rules. Outcome of consultation to be published later in 2020 when the UK would have exited the European Union (UK will still be bound by EU until end of 2020).

98. Dr Barker indicated that as the UK will leave the EU, ACMSF would no longer be able contribute to any EU debates on QACs and Biocides in relation to microbiological food safety. He also mentioned that as UK food industry are unable to provide case studies on how changes made to plant protection products MRLs (QAC and Biocides) are impacting their operations, it was difficult to see how the subgroup can continue to function. Dr Barker emphasised the significance of QACs and Biocides to industry and the complexity in being able to combine the assessment of chemical and microbiological risks.

99. Following discussion, members agreed that this situation of not being able to carry out risk assessment on this specific issue of the impact of plant protection products MRL rules on microbiological food safety should be drawn to the attention of the FSA's Senior Leadership Team. The Committee also raised the following questions: what can ACMSF do if the Committee's role/operations are hampered by external forces? How can ACMSF engage with EU bodies in the

future due to Brexit?

100. Dr Karin Goodburn (CFA) who attended the above meeting as a member of the public commented on Dr Gary Barker's update on the activities of the subgroup on quaternary ammonium compounds and biocides used food processing. She explained that new EU chlorates MRLs for commodities (except fish) are expected to be voted on at the relevant Standing Committee on Plants, Animals, Food and Feed (SCoPAFF) meeting on 17-18 February 2020. Review of QACs will follow. She informed the Committee that as the UK is about to exit the European Union, UK trade associations routes of representation in the EU food reviews would be through European Trade Associations that they are members of. It was highlighted that UK exit would mean the impending chlorate MRL rules will not be brought onto the UK statutes automatically. Karin mentioned that it is not known how the Health and Safety Executive will interpret these rules. It was noted that industry (Food and Biocides Industry Group and Global Food safety Initiative) have developed biocides usage guidance including how to minimise traces being carried over into food from hygiene uses. Members noted that the European Commission is aware of this work that has contributed to gaining special rules for processed (multicomponent) foods, where Food Business Operators, if found to have exceedances of chlorate MRLs, are to be given the opportunity to provide evidence that they arose from hygiene uses, not as Plant Protection Products. She added that FBIG members have also been advised to obtain chlorate results from their water suppliers as that is the primary source of chlorate, monitor pesticides residues in food data and identify other sources of potential chlorate in the course of food processing.

101. At the update provided at the October 2020 meeting Dr Gary Barker reported that although the group has not had a meeting in 2020 there has been activity in Europe on residue levels in chlorate and QACs. Members noted that the issue of residue level for chlorate in food has stabilised as the EU in summer 2020 agreed a maximum residue level acceptable to the food industry. No foods are now subject to the default level.

102. Members also noted that the food industry were happy with the position regarding QACs MRLs as they are not moving in the direction of default MRLs with the exception of infant formula. There are ongoing discussions on what counts as processed food. Dr Barker acknowledged the role of the regulator (Health and Safety Executive) who are dialoguing with Food Business Operators (Food Biocides Industry Group) to reach acceptable arrangements on this issue of MRLs for substances used in food processing. It was highlighted that the setting of MRLs

for substances used as disinfectants was an ongoing process.

103. Dr Karin Goodburn who attended the above meeting made the following comments on the highlighted subjects:

· Chlorate residues in food, QACs and Biocides: She reported that the Health and Safety Executive (the regulator for plant protection products) have been working with Food & Biocides Industry Group (FBIG) on compliance issues. FBIG earlier this year published information it had compiled for HSE on sources of chlorates in the food chain (primarily from hygiene biocides' usage) and what viable mitigations FBOs had implemented in key example food types.

· Regarding quaternary ammonium compounds, the EC has paused on further MRL-setting work as levels being proposed could not accurately be determined owing to isomers complicating laboratory methodology, and recognition of the importance of QACs not only in food hygiene, but also in the control of SARS-CoV-2. However, Member States' sampling data would continue to be gathered, for later review. FBIG hopes that an approach similar to that agreed on chlorates will be taken, although the UK will not be around the negotiation table.

Microbiological risk assessments in relation to food incidents

104. Dr Gary Barker reported that he succeeded Prof McDowell as the chair of the above group. He updated members on the activities of the group. Members noted the group (that reviews the FSA's risk assessments in relation to incidents) reviewed the following risk assessments published in June 2020 by the FSA:

• Risk assessment: coronavirus risk to UK consumers via shellfish and crops grown on land treated with sewage sludge

• Qualitative Risk Assessment: What is the risk of food or food contact materials and surfaces being a source or transmission route of SARS-CoV-2 for UK consumers?

105. The group in August/September 2020 reviewed a study on Survivability of COVID-19 under frozen conditions. Study that generated media interest was a preprint on work carried out by a group in Singapore demonstrating survival for up to 3 weeks of artificially inoculated Coronavirus on meat and fish. The group felt the study's methodology was poor and light on the scientific description of the work carried out. It was highlighted that the findings of the study had been rejected for publication.

106. A member commended the group for its contribution on the aforementioned risk assessments. Drawing attention to the risk assessment on food contact materials she questioned if the risk assessment could be made more accessible to consumers providing specific information on packaging consumers would appreciate.

107. She asked if there were plans for revisions/updates should new information come to light on packaging material and food in relation to Coronavirus. She added that consumers would benefit by having guidance that would be reassuring on food packaging during the pandemic. Dr Barker clarified that the risk assessment was produced by FSA and the group's role was to review and comment on it. He also explained that ACMSF's role was strictly limited to risk assessment and the group did not and should not stray into risk management such as producing consumer advice. Members noted that the risk assessment has informed risk management advice across government. Members were informed that nothing radical had happened in the literature since the publication of the risk assessment.

108. A member pointed out that there is a general expectation that this winter there will be less respiratory outbreaks because of measures taken to control coronavirus. She asked whether the FSA will consider carrying out a study on SARS-CoV-2 infections in bivalves molluscs during the winter period. ACMSF Scientific Secretary stated that the FSA had plans to consider the impact of COVID-19 on foodborne disease generally because of the big behavioural changes associated with lockdown. He noted the suggestion which he said will be passed to the FSA for consideration.

Antimicrobial Resistance Working Group

109. The chair of the above group (Prof Keevil) updated members on the activities of his group. He reported that the group reviewed the following studies:

- The FSA's report on survey of EU Harmonised Surveillance of antimicrobial resistance (AMR) in bacteria from Retail Meats (Year 5 – Beef and Pork, 2019). Reviewed in July 2020.

- Review of Antibiotic Use in Crops, Associated Risk of AMR, and Related Research Gaps. Reviewed in August/September 2020. Report was prepared by FERA Ltd for Defra and the FSA.

110. A member asked to see the final report of AMR use in crops study. Report was subsequently shared with the full Committee.

Surveillance Working Group

111. Dr Roy Betts (chair of the above group) reported that in July 2020 his group commented on the FSA's Guidelines for Undertaking Analytical Surveys. These guidelines assist FSA staff in commissioning and conducting food analytical surveys. Members comments were used to update the guidelines that was last reviewed in 2014.

Outcome and Impact of ACMSF Advice

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

113. Ad Hoc group on non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged foods report: this subgroup reviewed evidence on key aspects relating to the risk of non-proteolytic *C. botulinum* and vacuum and modified atmosphere packaged foods. Key outputs from this work were welcomed by the FSA and industry such as the group's recommendation on the support of a change in the FSA's guidelines on the ten-day rule in relation to fresh meat (lamb, beef and pork) and the recommendation to review the Committee's 1992 report on "Vacuum Packaging and Associated Processes".

114. Risk assessment on tick-borne encephalitis virus: the Committee commented on this risk assessment the FSA produced for DHSC and CMO concerning their request for an opinion on the risk to the public of infection with TBEV via the consumption of unpasteurised dairy products or of rare or undercooked meat from potentially infected animals in the areas where the virus had been detected in ticks. The comments were welcomed by the FSA.

115. FSA and FSS research priorities: the Committee was asked for views on the FSA's proposed Areas of Research Interest particularly to consider whether the proposals fully reflect the FSA's research and development needs in the area of microbiological safety of food. Input was well received by the FSA's Chief Scientist Team and used to strengthen the finalised document. FSS presented its Shiga toxin-producing *E. coli* research programme to the Committee for comments. ACMSF endorsed FSS's approach and provided comments for FSS to consider on their ongoing programme.

116. FSA's Food and You Survey – Wave 5. The Committee discussed and commented on this FSA's flagship social survey of consumer's reported behaviours, attitudes and knowledge relating to food safety and other associated

topics. ACMSF endorsed the next wave and identified issues for the FSA to consider.

117. Horizon scanning: the Committee's horizon scanning workshop held in June 2020 identified emerging issues around a series of specific questions and agreed a prioritised list of recommendations that could be seen to have the greatest impact on reducing foodborne illness. The secretariat is working with FSA Policy in progressing the high priority recommendations.

118. Incidents subgroup (reviews the FSA's risk assessments in relation to incidents): group reviewed the following risk assessments published by the FSA in summer 2020:

- Risk assessment: coronavirus risk to UK consumers via shellfish and crops grown on land treated with sewage sludge

- Qualitative Risk Assessment: What is the risk of food or food contact materials and surfaces being a source or transmission route of SARS-CoV-2 for UK consumers?

119. The group's comments were used to strengthen the risk assessments before they were published on the FSA's website.

120. Surveillance Working Group: group commented on the FSA's Guidelines for Undertaking Analytical Surveys. These guidelines assist FSA staff in commissioning and conducting food analytical surveys. Members comments were used to update the guidelines that was last reviewed in 2014.

121. Antimicrobial Resistance Working Group: group reviewed the following studies:

- The FSA's report on survey of EU Harmonised Surveillance of antimicrobial resistance (AMR) in bacteria from Retail Meats (Year 5 – Beef and Pork, 2019). Reviewed in July 2020.

- Review of Antibiotic Use in Crops, Associated Risk of AMR and Related Research Gaps. Reviewed in August/September 2020. Report was prepared by FERA Ltd for Defra and the FSA.

122. The group's comments were used to make appropriate revisions on the study reports before publication.

Information papers

123. 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 2020 were:

Paper number	Name of paper	Meeting number	Date of meeting
ACM/1330	Literature review on botulism in cattle, sheep and goats	96th	30 January 2020
ACM/1331	ACMSF Work plan	96th	30 January 2020
ACM/1332	ACM/1332: Update from other Committees	96th	30 January 2020
ACM/1333	Items of interest from the literature	96th	30 January 2020

Paper number	Name of paper	Meeting number	Date of meeting
ACM/1334	ACMSF's report on multidimensional representation of risks	96th	30 January 2020
ACM/1335	EUROBAROMETER report for the UK 2019	96th	30 January 2020
ACM/1336	EFSA Scientific Opinion: Whole genome sequencing and metagenomics for outbreak investigation, source attribution and risk assessment of food-borne microorganisms	96th	30 January 2020
ACM/1343	Annual update on the FSA's Antimicrobial resistance programme	97th	22 October 2020

Paper number	Name of paper	Meeting number	Date of meeting
ACM/1344	ACMSF Work plan	97th	22 October 2020
ACM/1345	Update from other Committees	97th	22 October 2020
ACM/1346	Items of interest from the literature	97th	22 October 2020
ACM/1347	Risk assessment: coronavirus risk to UK consumers via shellfish and crops grown on land treated with sewage sludge	97th	22 October 2020

Paper number	Name of paper	Meeting number	Date of meeting
ACM/1348	Risk Assessment: risk of food or food contact materials and surfaces being a source or transmission route of SARS-CoV-2 for UK consumers?	97th	22 October 2020
ACM/1349	FAO guide to ranking food safety risks at national level	97th	22 October 2020