ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES SUMMARY

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11)	**Summary**	• Contents of report not accurately reflected.	• Summary cannot capture every point.
	9	• Report states reducing *Campylobacter* carriage by broilers is now a practical proposition. However, this is essentially an unsupported assertion. Suggest inserting a sentence summarising the evidence at this point (para 19 also refers).	• This is adequately addressed in the relevant chapter.
	11	• Question evidence/argument that the onus should fall primarily on on-farm production to control the problem. What is the rationale for the insistence that the beginning of the chain is the one critical point for control?	• Key intervention is at primary level but the Report also identifies other areas for control.
	14	• The emphasis on short to medium-term options for tackling the problem appears to be driven by political expediency rather than rational assessment of the most effective strategies for progress – what are the benefits?	• Control options identified are the priority areas the ACMSF believe can yield benefits in the short/medium term based on practical measures.

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11) (cont.)	**Summary** 22	• Emphasis on poultry is very pervasive. This might lead to neglect of other sources of infection. See comments on sections 4.26-4.31 and 4.54-4.55.	• The emphasis is placed on poultry as this is the single most contaminated foodstuff and it is likely that reduced levels of *Campylobacter* will yield public health benefits.
ADAS (A12)	13	• Link between monitoring for contamination and country of origin labelling is important. The situation could arise where meat may have originated outside of the EU, been further processed in a Member State and then subsequently imported into the UK. • Therefore knowledge of the 'actual' country of origin of the primary product is essential.	• Agreed

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER ONE

From	Paragraph	Comment	ACMSF Response
	Background		
Rob Davies (A5)	Human *Campylobacter* infections in the UK; para 1.1	• Reduction in human *Campylobacter* cases in UK is highly significant & should be highlighted more strongly as it is likely to result from improvements already made in farm & abattoir procedures. Such information would encourage those poultry companies who are making efforts with monitoring and control by showing there has already been some benefit.	• Text amended
	Tables 1.1 & 1.2	• A large proportion of frozen chicken is imported. The high rate of *Salmonella* in this compared to fresh chicken suggests that imported chicken may be a significant source of human infection. This is backed by serotype, phage type and antimicrobial resistance data where human *Salmonella* strains often correspond with non-UK poultry strains.	• This may be true but it is not a primary issue for the *Campylobacter* Report.
		• Apparent difference in isolation rates for both *Salmonella* (Table 1.1) and *Campylobacter* (Table 1.2) between England and Wales and Scotland and Northern Ireland. This is not readily explainable by differences in the expected prevalence of the organisms in these regions so sample handling and laboratory effects should be investigated.	• This was reviewed as part of the discussion on the FSA chicken survey at a full ACMSF meeting.

From	Paragraph	Comment	ACMSF Response
	Background		
Rob Davies (A5)	Food chain interventions 1.15	• Scheduling of slaughter is not possible unless flock prevalence is low and up to two weeks' notice is given, which allows the possibility of late onset infection not being considered in the scheduling process.	• We believe scheduling may be useful in the future. However, these are comments drawn from the workshop and merely serves as a record of key outputs.
		• Since *Campylobacter* does not multiply on carcasses the significance of cross-contamination between positive and negative flocks is much less than for an organism such as *Salmonella*, which can multiply. Therefore the small numbers of *Campylobacter* transferred from previously contaminated equipment do not contribute much in terms of 'human' infectious doses, particularly if the scald tank is operated effectively.	
		• A better approach would be to use a rapid method, such as PCR, as late as possible prior to slaughter and use positive flocks for frozen or cooked products.	• Noted
British Poultry Council (A6)		• Note the Report's comment on scheduling *Campylobacter*-positive flocks last each day. Do not think this is feasible at present level of positive flocks but could be useful once levels have been reduced significantly. (Also note anomalous requirement under current organic farming rules that require organic poultry flocks to be slaughtered ahead of housed flocks.)	• Please see comment at the top of this page.
		• The Report comments that scheduling may also offer the option of heat treating or freezing meat from positive flocks. We do not think this is feasible even when incidence in flocks is substantially reduced because it would effectively kill extensive poultry production in this country.	• This may not be feasible but it is still an option. Please see comment at the top of this page.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER ONE (continued)

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11)	**Background** Scientific progress and research 1.17-1.19	• Acknowledged that *Campylobacter* is still poorly understood microbiologically, particularly with regard to its physiology and molecular biology. • Research in these areas may not lead to new short-term control measures but is essential to develop new insights into how the organism behaves in vivo and in the environment, which will in the medium-term have important impacts on control. • The report could have emphasised this link rather more than it has done. E.g. we need to know much more about which factors are important for in vivo growth of *Campylobacter*, as this will lead to the identification of specific genes that can be targeted in intervention programmes. Similarly, the factors that promote survival of the bacteria outside the host need to be identified.	• ACMSF recognises the need for ongoing research addressed in Annex but focus of Report is on active measures that can have impact in short/medium term.
Scottish Food Advisory Committee (SFAC) (A18) Society for General Microbiology (A11)	Interim Report on *Campylobacter* 1.3-1.5	• Disappointing to note that most of unanswered questions about biology of *Campylobacter* listed in 1993 report remain unanswered in 2004 in spite of much research.	

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER TWO - The organism, immune response and pathogenesis

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5) British Society of Animal Science (BSAS) (A8)	**Infectious dose** 2.13	• Estimates are likely to be under-estimates because of the poor sensitivity of detection of *Campylobacter* and diminishing numbers of organisms in stored outbreak related samples. This is important as the sampling regimes employed on broiler units are restricted to relatively low frequencies.	• Definitive data on infectious dose is not available and therefore all figures are estimates.
British Poultry Council (A6)	**Pathogenicity** 2.14	• Report details possible approaches to prevention and control of *Campylobacter* in chickens but provides little about high levels of multiple pathogenic strains of *Campylobacter* jejuni in other farming and recreational environments (see recent work at University of Liverpool). • These high incidences in cattle, sheep and recreational waters may have to explain the seasonal up lift in human infections which appears to precede incidences in poultry flocks & may be the source of increased infection in poultry through contaminated flies and other insects being drawn into poultry houses. • More work is needed on these sources as possible causes of infection in poultry, or as causes of direct infection In humans.	• Members agreed to amend the report to cross-reference this to Chapter 3. • ACMSF have recommended more data are gathered on incidence of *Campylobacter* in water and other food sources.
Rob Davies (A5	**Recommend-ations** 2.38	• Also possible to carry out intervention studies in humans using dietary changes, food and water treatments, probiotics etc to test food source related hypotheses.	• The ACMSF noted that the FSA is already funding work using serological markers to look for evidence of VTEC O157 infection using non-invasive samples. Further work needed before tools can be applied in population based studies to identify patterns and trends

From	Paragraph	Comment	ACMSF Response
British Society of Animal Science (BSAS) (A8)	**Cold response** 2.7	• The role of water suppliers to broiler flocks has not been thoroughly investigated. • *Campylobacter* has been isolated from nipple drinkers, water lines; header tanks and bulk water storage facilities, as well as surface water around broiler units. • Whilst comments are made about the effectiveness of robust biosecurity it is possible that our ability to produce good practice in the field is weakened because we are not controlling the risk from water borne infection.	• ACMSF identified water sources as a possible contamination source. • ACMSF identified that water should be of potable quality.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER THREE – *Campylobacter* Epidemiology

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5)	**Disease burden** 3.5	• Are the 86 deaths primarily attributable to *Campylobacter*? If so, this should be described in more detail as fatalities have been thought to be rare. • As antimicrobial resistance in *Campylobacter* is often quoted as a serious issue, some indication of the type of treatment in use for hospitalised patients would be informative.	• Working Group agreed that original wording was sufficient.
	Water 3.20	• Reword second sentence to read 'In an ecological study in Sweden, positive associations were found between the incidence of *Campylobacter* and average water pipe length per person. There were similar associates with ruminant density. These observations suggest that drinking water and contamination from livestock might also be important factors in explaining at least a proportion of human sporadic campylobacteriosis.'	• Members agreed to make amendment to text of the Report
	Epidemiological conundrums 3.23	• Suggest moving this paragraph to end of this section as it is highly speculative and poor ascertainment is most likely to result from the multifactorial origin and delays in carrying out investigations.	• Agreed and amendment made
University of Oxford – Department of Zoology and The Peter Medawar Building for Research (A7)	**Strains of human disease in the environment**	• The report focuses on strains causing human disease and considers how these may be traced into the environment. However given the substantial uncertainty concerning sources and the proportion attributable to any one source, a broader view of the population biology/ecology of *Campylobacter* may be useful. • With the application of shared sequence based typing methods as per recommendation 9.32 to diverse environmental niches and host species we could move to an overview of the extent to which a single pool of each *Campylobacter* species is shared by different hosts and the extent to which particular species or groups of species have separate populations of *Campylobacter*.	

From	Paragraph	Comment	ACMSF Response
University of Oxford – Department of Zoology and The Peter Medawar Building for Research (A7)	**Strains of human disease in the environment (cont.)**	• Obtaining such an overview may ultimately be more efficient than following hunches for the likely sources into particular parts of the food chain and should be considered. • This will involve collaboration between those collecting isolates in different sectors, those involved in typing, those working in microbial population genetics and epidemiologists. Specific potential benefits of this may be to allow: 1) Clarification of whether known sources show the full range of diversity found in human case isolates or whether there is evidence for missing sources contributing to human disease (highlighted in 3.23) 2) Attribution of human cases to environmental and food sources at a population level if there is substantial separation between *Campylobacter* populations in different hosts and environmental niches. • The extent of work and breath of collaboration necessary to bring this about mean that this potential may remain unrealised. Strong support and even direct co-ordination from the FSA may be important in facilitating such work.	• See Report Annex F.
British Society of Animal Science (BSAS) A8	**Seasonality** 3.10	• Seasonal variation in infection rates of broiler units exists in some, but not all farms. This presents the opportunity for investigating reasons for differences between farms, especially as it will be possible to identify farms that are controlled for some of the risk factors such as source of birds, feed, building management and hygiene programmes. Seasonality of infection rates in humans will be a function of infection rates in food consumed and the seasonal choice of foods/cooking habits. Separation of these factors would give the potential to inform the consumer of the changing risk associated with food preparation.	• ACMSF recommended further investigation of seasonality in the Report.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER THREE – (continued)

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11) Scottish Food Advisory Committee (SFAC) (A18)	**Recommendations** 3.30-3.33	• In light of these deficiencies in knowledge, the categorisation of studies on the seasonality, levels in specific foods, contribution of foodborne transmission, surveillance of retail chickens, surveillance of other poultry meats and surveillance of red meat at Priority A is welcomed. • However, studies on these topics have been done before and their results have not resolved the 'epidemiological conundrum'.	• The ACMSF notes that the FSA is funding several research projects, and will take stock when this programme is completed. • The ACMSF notes that the FSA is planning a meeting of key groups to examine the feasibility of linking studies on *Campylobacter* in human illness, animals, the environment to the rolling surveillance of food. Current chicken survey work providing seasonality information. Sentinel surveillance to be initiated in 2004/5. FSA funding review of studies on cross-contamination.

Scottish Food Advisory Committee (SFAC) (A18) Society for General Microbiology (A11)	**Epidemiol-ogical conundrums** **3.22 – 3.26, 3.10, 3.17-3.18**	• In most case control studies the source and transmission route of the majority of human *Campylobacter* cases remains unexplained – an epidemiological conundrum. The strong seasonality of human infections also remains unexplained. Epidemiological studies on the consumption of chicken as a risk factor have given contradictory and confusing results. • If such studies were to be done with *Salmonella* it would go without saying that all isolates would be typed using methods that index genotype to a close degree; serotyping and subsequent typing with phage do this. For *Campylobacter* there is good evidence that such methods do not. This is why their epidemiological utility has been limited. • Of all the typing methods currently available and listed in the report only MLST meets population genetic requirements in this regard. Its only disadvantage is cost; but its advantages in all other respects over all other methods are so great as to categorise their continued use as a waste of money. The report says (9.22) 'that despite the large investment in typing methods over recent years, there have been few tangible epidemiological or public health benefits'. So while the report's recommendation 'that the FSA needs to take a firm initiative in bringing together laboratories capable of applying MLST so that investigative programmes can be designed to improve our epidemiological understanding in the next few years'' is welcome – the lack of urgently in this recommendation and its lack of linkage to the studies listed at the beginning of this para is a major weakness. Without such linkage these studies will still be unlikely to resolve the conundrum.	• Members agreed to make an amendment to the text of the Report

From	Paragraph	Comment	ACMSF Response
LACORS (A16)	***Campylobacter* epidemiology** 3.33	• Integrated approach outlined at para 3.33 is welcomed so the 'meaningful comparisons' of *Campylobacter* in ready to eat, raw foods and both humans and food animals can be made. From point of view of ongoing surveillance as well as snapshots (para 3.33) and the need for population studies (paras 3.31-3.32) it should be noted that LACORS is working with HPA to pursue these matters. • In discussion with FSA with a view to making important contribution towards these recommendations (3.31-3.33) through the co-ordinated sentinel surveillance work due to commence later this year.	• The ACMSF notes that FSA surveillance of retail chicken is to continue for at least the next 3 years, on a rolling basis. The FSA is already committed to gathering more extensive data on the incidence of *Campylobacter* in foods but aware of need to fit in with the surveys that have already been prioritised/planned. • See Annex F to the Report.

From	Paragraph	Comment	ACMSF Response
Alan Speight – FSA Programme Advisor on B15 Project **(**A1**)**	**General**	• key chapter. More emphasis needs to be given to restocking and people measures. More guidance is required on the 'hierarchy of risk'. • Major biosecurity risks are :- **RESTOCKING** – disinfection, turnaround time, drying, fogging, no multiage sites, no feed carry over. The quality of the restocking period in an important breakpoint in infection control. **PEOPLE** – limit visitors, auditors, workman, log books, clothing, hand washing, inspection windows. Important to defer and control people into intensive farms. **BOOTS** – dedicated, step over benches, dirty/clean sides, limited doorways, phenolic boot dips – A major critical control point. **WATER** – flush lines and header tanks with acid, between crops ideally, then threat water ongoing, to eradicate biofilm and grazing protozoal protection of *Campylobacter*. There is continual evidence of water as an infection source or vector – not only *Campylobacter* but other gut health organisms. **THINNING** – disinfection of crates, modules, equipment and the development of a hygienic system of control. Very difficult challenge to biosecurity.	• Working Group Members agreed to revise text. • Agreed but the intention of the Report is not to draft an industry code of practice but to identify key areas where intervention may reduce *Campylobacter* prevalence.
	Freezing 4.52 4.60 cross reference to 5.6 5.8 5.36	• Freezing only given a passing mention – more detail required. • Validated FSA work (unpublished) from University of Bristol using carcass surface treatment with a twofold log reduction indicates 1 log reduction on farm followed by 2 log reductions in abattoir essentially changes the public risk of infectious intestinal disease dramatically.	• Freezing is identified as a means of reducing *Campylobacter* but this is currently not applied to all birds and emphasis on control at farms stage remains of primary significance. • Report text amended.

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5)	**Sources of *Campylobacter* spp. in chickens** 4.5 4.6	• Add to the list 'contaminated personnel' and 'equipment at times other than thinning', especially when placing new litter in houses, weighting or carrying out maintenance. • These are 'potential' routes – especially vertical transmission and contaminated feed which are likely to be extremely rare. • The second bullet point is not widely accepted in relation to age, but there may be some flock differences. Management changes which increase susceptibility, such as diet or anticoccidial treatment changes, increasing growth rate and stocking density, increasing ventilation rate, may also play a part in the '3 week effect'.	• Report text amended. • The ACMSF notes that the FSA is working with stakeholders to identify improvements in other biosecurity measures and promote these as part of the Biosecurity Campaign.
	Contaminated water 4.8	• Ozone treatment of water is not to be encouraged because of toxicity for operators and is unlikely to be effective at levels used. Increased rates of chlorination per se, not just using chlorine dioxide, can be helpful as levels of chlorine in main water fall by the time the water reaches the end of the drinker lines. • Organic acids such as peracetic acid, sometimes used in combination with hydrogen peroxide or stabilised with silver to enhance the stability and antibacterial effect, and reduce corrosiveness is also useful. More work is required to assess the effect of higher levels of such treatments immediately pre-slaughter on the *Campylobacter* burden in infected flocks as this could be a worthwhile intervention to reduce numbers of organisms in the gut.	• See Annex F to the Report.
	4.9 **Contaminated feed** 4.12	• Cup drinkers as well as bell drinkers become heavily contaminated with dust and bacteria. • Feed can become contaminated during delivery by wild bird droppings from outloading gantries in feed mills or contaminated pooled water on sheeting of delivery lorries in wet weather. • Survival of the organism would be short in the dry dusty environment of a feed lorry and feed bin so feed which had been contaminated as above would have to be fed to birds relatively quickly to establish infection. • A more unknown quantity is the practice of saving feed and moving it between farms at depopulation. This may allow contamination from floor surfaces and wildlife pests but for the same reasons as stated, is not likely to be a major risk. Survival of *Campylobacter* in such material should be studied further.	• ACMSF have identified feed as a possible vehicle for introduction of *Campylobacter* but feel controls in place for *Salmonella* are likely to be sufficient.

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5) (cont.)	**Domestic and/or wild animals** 4.15	• Flies and other arthropods do enter poultry housed in larger numbers in Spring and Summer and may be involved in the 'Summer Peak' in some cases where there is a source of contamination close to the houses.	• ACMSF have identified these as potential vehicles for *Campylobacter*.
	Contaminated transport crates, vehicles and personnel at flock thinning 4.17 4.21	• Modules probably pose a bigger risk than crates because of the solid material which may accumulate and drop off the units. • Unlikely to ever be possible to manage UK broiler production without some form of thinning unless a premium market for non-thinned birds is developed. Could be more likely to succeed if a more biosecure approach to thinning. This would involve better formal planning to minimise the number of thins for each flock and to keep them as close to slaughter as possible.	• The ACMSF notes that output from FSA-funded research will identify the best operating regime for existing crate washing, identify improvements which can be made, and propose measures for future incorporation in the design of new crate washing facilities. • The ACMSF notes that the Agency's commissioned research project on thinning, will review best thinning practices.

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5) (cont)	**Contaminated transport crates, vehicles and personnel at flock thinning** 4.21	• Thinning gangs protective clothing would be provided by the farm and vehicles and the immediate exterior of the house entrance disinfected before entry. • Crates modules would be placed on a pad provided by the farm rather than pushed along the litter and the house would be internally subdivided so that only one section was emptied. This would also reduce stress on the remaining birds. The barrier would be left in place for 24 hours, during which most introduced *Campylobacter* would have died., then the remaining birds would be allowed full access to the house. • Resistance to *Campylobacter* may also be improved by increasing chlorination or acidificaion of water over the thinning period. This sort of approach should be investigated in an intervention study.	• As above. • The ACMSF notes that output from FSA-funded research will identify the best operating regime for existing crate washing, identify improvements which can be made, and propose measures for future incorporation. • The ACMSF notes that the FSA will consider suggested research options as part of its B15 poultry review.
	Effects of feed withdrawal 4.24	• Although there may be rapid acquisition of *Campylobacter* after exposure, it will take 1-2 days for high numbers of organisms to develop so infection acquired during transport is not significant in terms of risk as birds which have been infected at the farm.	
	Environment as a source of flock colonisation 4.26	• *Campylobacter* can survive for prolonged periods in moist conditions – drainage channels, puddles etc may maintain strains of *Campylobacter* originating from previous flock during washing out of houses.	

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER FOUR (continued)

From	Paragraph	Comment	ACMSF Response
Rob Davies,(A5) (cont)	**Environment as a source of flock colonisation** 4.27	• Second to last sentence 'Almost all birds will become *Campylobacter*-positive within a few days', - need to research why dome bird do not become positive as there are many factors relating to the immune response or gastro-intestinal environment which can lead to development of future biological control options.	
	4.29	• Hygiene barriers only work well when operated properly, which most are not, so it is unwise to discard disinfectant foot dips. Many foot dips use disinfectants which decay rapidly after dilution and exposure to air or become rapidly inactivated by even small amounts of organic soil so more detailed guidance for farmers is required.	• The ACMSF notes that guidance for farmers forms part of the FSA's biosecurity campaign
	4.31	• Second sentence – The number of houses per farm is typically lower in Scandinavian countries so the difficulty of changing protective clothing and washing hands between houses is also reduced.	
	Broiler flock management and *Campylobacter* colonisation 4.32	• *Campylobacter* infection is transient in wild birds so it is not really a normal commercial organism of birds. In domestic poultry flocks the high stocking rates probably perpetuate recycling infection of the life of commercial broilers.	
		• More work is needed on the behaviour of *Campylobacter* in individual birds in small groups of chickens and in breeding flocks to inform these issues.	• The ACMSF notes that FSA will consider suggested research options as part of its B15 poultry review.

From	Paragraph	Comment	ACMSF Response
Rob Davies, (A5) (cont)	**Carcass treatments** 4.49	• Chemical treatments vary hugely in their formulation, concentration, method of application and application rate. More careful comparative work is needed on potential products.	
British Poultry Council (A6)	**Bio-security**	• Emphasis of the Report is on bio-security controls on farms which are presumed by the ACMSF to be the reason for the success. Many farms in the UK employ similarly rigorous bio-security measures as are used in Scandinavia but with less enduring success. • Not known what the general loading of *Campylobacter* is in the environment in these countries compared with the UK where studies point to a high environmental incidence, and what impact that has in respect of the effectiveness of the bio-security measures. • It is thought that the environmental loading is likely to be far lower because of the more severe winters in those countries. Measures which are effective there may not be effective here in the face of a higher external environmental challenge. • It is interesting to note that, despite the success on poultry farms, the per capita incidence of human *Campylobacter* infection in the Scandinavian countries cited in the Report does not appear to be significantly lower than in the UK. • The Report's assertion that *Campylobacter* control of housed birds is possible through practical bio-security measures on their own is overstated. • Long-term success in UK is likely to come from a combination of scientific techniques, as well as rigorous bio-security on farms.	• See Annex F to the Report.

From	Paragraph	Comment	ACMSF Response
British Poultry Council (A6) (cont.)	Bio-security	• Some techniques are still not ready to be applied commercially either because the delivery mechanisms are not perfected or because the regulatory requirements have still to be met. • Certain bio-security measures are very difficult to maintain in the practical farming situation and some run counter to health and safety requirements designed to protect the stockmen. • Suggest that more scientifically informed measures are required in order to move away from a heavy, blanketed bio-security approach to specific actions targeted against specific risk factors on individual farms.	• The ACMSF notes that the Agency recognises that *Campylobacter* cannot be controlled in housed birds through biosecurity measures alone. Our message is that the first commitment from the industry must be rigorous biosecurity alongside high standards of stockmanship and attention to good health and stress control.
Jamie Robertson and Dr Alan Duncan - British Society of Animal Science (BSAS) (A8)	Biosecurity	• Robust biosecurity is effective in improving whole flock health, and this is a message that can be used to support implementation of good practice. • However, nearly all the science focuses on the impact on infection rates and there is a lack of data on financial benefits of biosecurity practices. This is especially true in the case of CJ because the birds are apparently unaffected. • Better financial data would be a good stimulus to the adoption of good practice.	

From	Paragraph	Comment	ACMSF Response
British Society of Animal Science (BSAS) (A8) (cont.)	**Sources of Campylo-bacter in chickens** 4.5, 4.6	• The observation that broilers are seldom shown to be shedding *Campylobacter* before the 2nd or 3rd week of age is common. It has led to a number of reasonable suggestions, not least that the birds become 'infected' within the 14-21 days of age. The implication is that we need to study possible routes of infection in order to limit the risks. • It is suggested that validity of the sampling regimes employed during previous studies are examined to ensure that the sampling pressure has been adequate to identify infection within a crop of birds that may be carrying a very low level of infection. • Bird metabolism changes exponentially with age, and environmental exposure to potential risk factors such as water, feed, contaminated litter and stocking density are constant. Sampling protocols do not always address these changes. • The possible role of maternal antibodies and bacterial antagonists in poultry could be examined under controlled, replicated conditions. • Whilst this type of work is financially expensive it is remote from the difficult, uncontrolled (biological) conditions that exist on commercial broiler units.	• The ACMSF note that the FSA will consider suggested research options as part of its B15 poultry review.

From	Paragraph	Comment	ACMSF Response
British Society of Animal Science (BSAS) (A8) (cont.)	**Sources of *Campylobacter* in chickens** 4.5, 4.6 (cont.)	• There is little mention in the various field studies of the role of specific normal management factors that may impact on bird immunocompetence. Most birds in the UK will be exposed to water borne vaccines at between 14 and 17 days of age, and to a change in diet on 4 or 4 occasions. It may be possible to confirm or eliminate these factors as relevant to the epidemiology of CJ infections.	• The ACMSF note that the FSA will consider suggested research options as part of its B15 poultry review.
	Contaminated water 4.8	• Studies involving water are another area where the various works could be examined to test the probability of detecting very low concentrations of *Campylobacter*. The flow rate of water into a house is relatively low during the first few days of a crop, and thereafter increases exponentially. The probability of each individual house and each bird being exposed to *Campylobacter* increases with flock age if water is one of the significant risk factors.	
	Vertical transmission 4.10, 4.11	• The role of vertical transmission as a risk factor is unresolved. The continued presence of uninfected farms supplied by the progeny of infected breeder flocks suggest that these may be good sites to investigate the role of maternal antibodies and antagonistic flora, as well as biosecurity arrangements.	• Same as above.
	Carryover from a previous crop 4.13	• Whilst the inference is given that effective terminal hygiene programmes and adequate time between restocking are major benefits in controlling carryover of infection, there is little mention given to the competence of building structures.	• Working Group Members agreed to revise the text of the Report
		• Differences in the integrity of flooring and walls (due to variable construction, maintenance and age) means that identical hygiene programmes will have different outcomes on different buildings. The areas outside houses may also be important risk factors, as it is very difficult to clean sites without some contaminated water becoming an uncontrolled risk factor, leading to potential contamination of footwear.	

From	Paragraph	Comment	ACMSF Response
British Society of Animal Science (BSAS) (A8) (cont.)	**Contaminated transport crates, vehicles, personnel at flock thinning** 4.16-4.21	• In view of the suggestion that thinning could become obsolete it may be beneficial to examine the design, construction and cleaning of crates to produce products and procedures that reduce the risk of contamination.	• Output from research will identify the best operating regime for existing crate washing, identify improvements which can be made, and propose measures for future incorporation.
		• The financial value of general good hygiene in and around poultry sites, with the probable benefits to bird health and performance, could be investigated and promoted.	
Society for General Microbiology (A11)	**Environment as a source of flock contamination** 4.26 4.21 to 4.31 see also 4.54-4,55	• This application of good practice can be difficult to achieve in the agricultural environment. The quality and delivery of training is highly variable compared with other major industries in spite of the known advantages. Targeted support for the training on sentinel farms, with measured outcomes, may help the industry to become more proactive in this area.	• ACMSF noted and will pass comments onto the FSA for consideration in future phases of the bio-security campaign.
		• There is some discussion about an environmental connection to *campylobacter*iosis. However, two issues are not fully addressed:- it is possible to isolate *Campylobacter* spp. from a range of environmental sources (surface waters, manures, birds, wild animals etc) but it is not clear that these strains of *Campylobacter* can actually cause infection; • There are gaps in our knowledge on the pathways by which *Campylobacter* spp. get from the environment back in the food chain. • Both issues are important research areas which should be investigated.	

From	Paragraph	Comment	ACMSF Response
ADAS (A12)	**Carcass treatments** 4.46-4.53	• Report appears to focus very much on farm and plate with limited emphasis on the processing stages. Consequently, there is little comment on the risk of cross-contamination at slaughter/processing. Although this section of the report refers to research on carcass treatments, there appear to be no recommendations made on this important area.	• Paragraph 4.60 refers.
The Halal Food Authority (A14) Ulster Farmers' Union (A13)		• Having identified that freezing of poultry reduces the risk of *Campylobacter*, efforts should be made to make stakeholders aware that inefficient thawing of poultry and subsequent inefficient cooking can and does also cause the infection in question. • Agree that there must be clear advice given to consumers and industry about key steps that should be taken to avoid infection.	• The ACMSF notes that FSA's food hygiene campaign promotes advice on how to avoid food poisoning by thawing and cooking poultry correctly.
Ulster Farmers' Union (A13)	**Conclusions** 4.58 (&10.20)	• Concerned that report highlights that broiler farms should be 'species mono-specific'. This is not possible in Northern Ireland where broiler farms tend to be much smaller than those in GB and are run alongside other enterprises on farms. In NI poultry houses historically have been erected to supplement other enterprises eg dairy unit on 'family farms'. However there are strict biosecurity measures in place on these farms to minimise any risk of infection. • The vast majority of farmers in NI are farming under the Assured Chicken Production (ACP) code. Therefore are already practising the strict biosecurity conditions etc that the report recommends. Broiler farms are inspected regularly by the processing companies for these aspects in addition to the ACP audit. • Welcome the recognition that broiler chicken production is extremely price competitive and that the industry is faced with continuing threats of import penetration. Concerned that such imports would not be subject to same standards and control to target *Campylobacter*. • Highlight that any routine surveillance that is to be carried out on retail chicken should distinguish between chicken produced in the UK and chicken produced elsewhere. Concerned that any additional controls increase costs of production and therefore question the competitiveness of the local broiler industry, this must be considered.	

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER FOUR (continued)

From	Paragraph	Comment	ACMSF Response
Scottish Food Advisory Committee (SFAC) (A18)	**Conclusions** On-farm measures for controlling *Campylobacter* spp	• On-farm measures for controlling *Campylobacter* spp. in chickens should be implemented as it is estimated that tackling hygiene standards at broiler farms and improving hygiene standards at slaughter could reduce by at least 50% the 2002 levels of contamination in retail products. • The recommendation for an industry-wide programme to spread 'good farming' practices and biosecurity measures are essential and it would fall with the FSA remit to take forward this recommendation.	• The ACMSF notes that Phase 2 of the FSA's Biosecurity Campaign will provide more detailed information on best practice through a series of meetings and workshops. As part of the evaluation activities carried out for phase 1, stakeholders were consulted to determine the most successful mechanism for delivery.
Society for General Biology (A11)		• The report says that '*Campylobacter* control is possible for housed birds, as interventions in Scandinavia, particularly in Norway and Sweden, have illustrated', While it is intuitive that better biosecurity should reduce the risk of *Campylobacter* infection in hen houses, the Scandinavian evidence base for this assertion is weaker than presented in the main body of the report. • Is it significant that the Norwegian and Swedish industries operate in very different climates from the UK? • How relevant is the low percentage of *Campylobacter* positive flocks in these countries a decade ago (18% in Norway in 1991 & 13.3% in Sweden in 1992) to the success of their current control programmes? The report doesn't say but it should.	

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5)	**Broiler farm visit** 5.9 5.10 ***Campylobacter* in Norwegian broiler flocks** 5.19 **Overall conclusions from Denmark/Norway visits** 5.36	• Second to last sentence – Is 50 m between houses correct? Many British houses are about 5 m, so not comparable if 50 m is correct. • Presumably the physical hygiene barrier also involved a change of boots (+/- other protective clothing), otherwise it would be pointless. • Table – routines for hand washing, is 3.3x increased risk when hands always washed correct? If so, discuss what might be going wrong – eg lack of drying? • Denmark's establishment for a premium market for *Campylobacter*-free chicken is a route, which should be followed in UK. There appears to be reluctance from major retailers to go down this route because of fears of raising public fears about contamination in general. This should be explored with retailers as it may be a block to further progress.	• This has been checked and the Report will be amended to read between 5-10 m. • This assumption is correct and the Report has been amended to reflect this. • Typographical error which has been corrected in the Report. • This is a commercial consideration.
The Halal Food Authority (A14)		• Lessons to be learnt from preventative measures taken in Denmark, Norway and Sweden in regard to contamination of chicken meat or poultry meat. • It should be noted that many farms and relevant establishments in the UK are running a tight ship of safety and efficiency.	

From	Paragraph	Comment	ACMSF Response
LACORS (A16)	6.6 (&7.25)	• In relation to these recommendations, some data on prevalence of *Campylobacter* in meats other than poultry is already available from the raw meat sampling work that LACORS and HPA commended in 2003. • Information will be collated and made available in due course.	• The ACMSF notes that FSA is to consider surveillance of other types of poultry once the results of the 2004 EC co-ordinated sampling programme on poultry meat (including turkey) are known. • Noted.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER SEVEN –
Measures to prevent *Campylobacter* contamination of meat other than chicken and other poultry meat

From	Paragraph	Comment	ACMSF Response
Rob Davies (A5)	**Control of *Campylobacter*** 7.7	• Numbers of *Campylobacter* organisms in the intestine of red meat species are lower so it is not surprising that carcass meat, which is also stored in dry air for much longer than chicken, is relatively infrequently contaminated.	• Noted.
		• The role of offal and low cost mince should be investigated further.	• ACMSF have recommended surveillance of other foods.
	Conclusions 7.23	• More quantitative data on primary and cross-contamination in abattoirs is needed to put the cross-contamination issue in context.	• This may be useful if surveillance data indicated high prevalence in foods. Text of the Report amended.
Scottish Association of Meat Wholesalers (A9)	**Recommendations** 7.25	• Note that poultry meat, both home produced and imported is the major source of infection & that there is limited data on other meats.	• The ACMSF noted that the FSA will commission pilot work in 2004 to develop methodology for a red meat survey. Findings from ongoing surveillance of meats by the HPA/LACORS will be considered before undertaking any national surveillance.
		• The report highlights government and industry control measures currently in place for the red meat sector with these, in effect, reducing the possibility of cross contamination. The new EU hygiene measures will be of additional benefit not least with better food chain information being available.	• Noted.
		• Support recommendation at 7.25	
The Halal Food Authority (A14)	**Recommendations**	• Stringent monitoring and surveillance should be done of slaughterhouses, cutting plants and butcheries owned and managed by this particular fraternity and counsel and advice should be readily made available for the betterment of all consumers of halal at large.	• EU microbiological criteria are soon to be introduced that include recommendations for monitoring hygienic status of carcass meat and meat preparations.

From	Paragraph	Comment	ACMSF Response
Livestock and Meat Commission for Northern Ireland (A15)	***Campylobacter* levels in animals** 7.3	• Derived some comfort for industry from findings of the relatively low contamination rate of cattle and sheep faeces with *Campylobacter* Sp. and that this contamination often does not carry through to the associated meat on retail sale.	• Noted.
	***Campylobacter* levels in meat** 7.5 & 7.9	• Appreciative of recognition of the Clean Livestock Policy that has been implemented in industry.	• Noted.
		• Whereas would not wish the contamination rates that have found to be ignored, would suggest that whatever surveys are conducted and/or measures put in place, they should be proportionate to the risk.	• The ACMSF notes that a FSA pilot study is to be carried out to develop methodology for a red meat survey.
		• It is clear from report that this risk is greater in the housed, intensive livestock sectors and would suggest that any primary and immediate action is required there.	• Pending surveillance findings.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER EIGHT
Measures to prevent *Campylobacter* cross-contamination in domestic and catering environments

From	Paragraph	Comment	ACMSF Response
Warwick District Council (A3)	**Effective cooking** 8.7	• The advice to monitor temperatures is admirable and vital, but the type of meat thermometer requires specification. The traditional bimetallic coil meat thermometer does not meet with approval.	• The ACMSF recommends monitoring of temperature and it is for industry guides to specify relevant types.
Rob Davies (A5)	**Cross-contamination** 8.12	• Consideration should be made of marketing chicken carcasses and portions in oven-proof wraps. This would minimise cross-contamination in domestic kitchens. If this approach was successful similar arrangements could be made for catering establishments but contamination from chicken destined for frying would remain a problem.	• This is principally a commercial issue
		• Perhaps biofriendly packaging could be developed which would dissolve on frying.	• Noted.
	8.14	• The results of the kitchen cloth survey are surprisingly low and possibly reflect sample handling and culture procedures.	• Noted.
	8.17	• It can be helpful to microwave chicken for the barbecue first to cook the deep tissues then to finish off on the barbecue. Effective procedures for this approach could be identified experimentally.	• The ACMSF notes that the FSA ran a TV and radio summer eating advertising campaign with leaflet publicity promoting advice on barbecue cooking in 2002. Published web site information was also repeated in 2003 and 2004. Related web site material on food poisoning was also published. See Annex F of the Report.
Scottish Association of Meat Wholesalers (A9) (cot)	**Recommendations**	• Supportive of highlighting measures to be taken in catering and domestic environments and therefore agree with the recommendations in this chapter.	

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER EIGHT (continued)

From	Paragraph	Comment	ACMSF Response
The Halal Food Authority (A14)	**Hygiene advice**	• HFA would propose that all domestic catering establishments namely restaurants, party and function caterers should be licensed and trained under a charter and should be regularly inspected and monitored for hygiene and food safety.	
		• It is interesting to note that a large number of caterers for halal trade seem to be somewhat unfamiliar with rules of segregation of uncooked and cooked meat, temperature controls (especially of poultry) prior to cooking, during cooking or whence they transport foodstuffs to the places where these are served to consumers at ethnic functions or parties.	• The ACMSF notes that the FSA, in 2002, published information on how to use probe thermometers and minimum cooking times for meat. FSA issued advice to caterers on cooking, cleaning, chilling and cross-contamination as part of the Food hygiene Campaign initiatives. Information is made available in a range of languages.
	Companion animals 8.18	• It is imperative to iterate Muslims do have a habit of keeping pets either far away from the food preparation and consumption areas and they would do ablution after touching pets.	• Risks associated with the carriage of *Campylobacter* in pets will be considered where food safety advice is being developed or revised.
		• However, these households do wash raw meat prior to cooking. What suggestions have or are being offered to minimise the spread of organisms within such kitchens.	• The ACMSF notes that the FSA TV advertising campaign (June 2004) promoted advice on how to avoid cross contamination. Supported by web site activity which included information on handling and preparation of raw meat.

From	Paragraph	Comment	ACMSF Response
LACORS (A16)	**Recommendations** 8.33	• Recommendations in this chapter to prevent cross contamination in catering environments are logical and underline the importance of the ongoing food hygiene work carried out by local authorities.	
		• In relation to recommendation 8.33 it was suggested that careful thought needs to be given to how awareness of risks can be improved, particularly where these may not be immediately obvious.	• The ACMSF notes that the FSA TV advertising campaign (June 2004) promoted advice on how to avoid cross contamination. Supported by web site and publicity activity which included information on handling and preparation of chicken and ways of avoiding cross contamination.
	8.27	• In this context it is suggested that the production of a leaflet might assist authorities in disseminating the advice at recommendation 8.27 not to wash raw chicken to minimise aerosols.	
		• Another area that may be worthy of consideration is the production of a leaflet on raw meat packaging. LACORS would be willing to discuss and share some initial work on this (linked to a LACORS/HPA national study in 2002).	• As above.
	8.24	• In recommendation 8.24, it was highlighted that not all meat thermometers are reliable – and in any more detailed advice produced it may be advisable to give guidance to avoid unreliable types being used (se O.P Snyder Limitations of bimetallic coli thermometers in monitoring food safety in retail operations 1996. Dairy Food and Env San., Vol 16, No 5 pgs 300-304)	• The ACMSF notes that the FSA published information on the use of cooking thermometers and minimum cooking times for meat in 2002 as part of the Food Hygiene Campaign initiatives targeted at caterers and food businesses and the Christmas turkey eating advertising campaigns (2002, 2003). Information on temperature is also available on the FSA web site dedicated to caterers.
		• LACORS/HPA study of cleaning in food premises highlighted issues in relation to cross contamination and cleaning in food premises which are very relevant to this Chapter and on how cross contamination within catering environments might be minimised.	• Noted.

From	Paragraph	Comment	ACMSF Response
Scottish Food Advisory Committee (SFAC) (A18)	**Recommendations**	• Within the domestic and catering environments the recommendations regarding not washing raw meat and poultry and guidance on cooking should be widely disseminated to caterers and the public, as should the advice on domestic pets and carriage of the organism. • Incorporation of hygiene and safety principles as part of both the primary and secondary curricula should be taken forward.	The ACMSF notes that : • The FSA highlighted the risks of cross-contamination from washing chicken as part of promotional campaign activities carried out in 2004. FSA published information on handling, preparation and cooking of raw meat. • Some information on pets is covered as part of the FSA's Biosecurity Campaign initiative. • Several FSA initiatives have been launched including a state of the art cooking bus, Bad Food Live! Information packs for teachers and supporting web based materials aimed at raising awareness of food hygiene issues amongst children. Also roll out of 'Mission Possible' initiative. • The FSA is also working with the Scout Association to look at opportunities to raise food hygiene awareness amongst children.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER NINE- *Campylobacter* detection and typing

From	Paragraph	Comment	ACMSF Response
University of Southampton (A2)	***Campylobacter* typing** 9.19, 9.21, 9.29, 9.30 to 9.33, table 9.2, table 9.3, cross reference 10.59, 10.62, 10.63	• Surprising report focuses on MLST typing - major international symposium in Aarhus on *Campylobacter*, Helicobacter and Related Organsims (2003) heard from several speakers that AFLP typing was the gold standard, not MLST	• The ACMSF notes that the FSA is to initiate a programme of work in 2004/5 to bring together key laboratories to examine the scope to undertake MLST on a routine basis. See Annex to the Report.
Rob Davies (A5)	**Lessons from typing studies** 9.22	• The 'creeping featurism' quoted is a result of failing to invest sufficiently in optimising and standardising typing methods at an early stage. In the absence of this, each laboratory naturally finds the best way to get the method working well with their particular equipment and conditions.	• Noted.
		• Recommended that government scientific co-ordinators should seek to validate and establish standardised national and international methods which arise from research.	• As above.
	Detection 9.24	• PCR (either direct or following a short enrichment) is already in routine use in Denmark and would be suitable to provide a 'same day' result in UK. • Penner serotyping in combination with antimicrobial resistance pattern and phage type gives good discrimination when carried out in an appropriate reference laboratory. The coverage of these schemes could be further developed by using sera raised to 'untypable' poultry strains and phages from poultry waste. • Sequence based testing such as MLST is likely to be less expensive and more transferable in the longer term. Large studies are needed to establish a suitably robust but discriminating typing 'scheme'. This will be based on the interpretation of sequence variations and is likely to be difficult to establish unless veterinary, food and medical authorities can work together to develop a harmonised typing scheme which can be easily applied and which makes epidemiological sense.	

From	Paragraph	Comment	ACMSF Response
University of Oxford – Department of Zoology and The Peter Medawar Building for Research (A7)	**Recommendations** 9.32 9.33	• The Report identifies the problems of an excess of complex typing methodologies and emphasises that MLST and sequence typing will be the main direction of future typing and be expected to bring major benefits. • Recommendation 9.32 is welcome. • Recommendation 9.33 is worrying because although the typing and database technology for MLST have been well established there are substantial gaps that may limit the exploitation of this sequence information. Research effort in translating this technology into improved understanding of the epidemiology and ecology of *Campylobacter* is an important step between the current position where the core laboratory research has been completed and accepted as valid and accepted as valid and any universal implementation of this approach for epidemiological or population biology studies. • At present the extent to which strain type is predictive of source is uncertain as is the extent to which different source populations overlap. The level of discrimination that is optimal for defining linked clusters has bot been established and whether this will involve addition of extra loci to a core MLST scheme plus *flaa* genes is open to debate. Clarifying this in a systematic way is important and should be an antidote to the 'creeping featurism' (para 9.22) that can occur in the application of typing methods against which the report counsels. • Since these areas of translation from laboratory to practice can fall between funders of pure research and state agencies this may well be an area where the FSA takes a lead in supporting applied research to optimise the coherence and benefit of sequence based typing.	• As above.

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11)	***Campylobacter* Typing**	• With *Salmonella* all isolates would be typed using methods that index genotype to a close degree; by a happy chance serotyping and subsequent subtyping with phage do this. • The HPA has made major and productive effects to develop a reasonably rigorous and useful tool based on serological and phage typing for *Campylobacter*. However, some scientists believe that such methods do not work with *Campylobacter* and this is why their epidemiological utility has been so limited. • Of all the typing methods currently available and listed in the report, MLST appears to meet population requirements best in this regard, although it is expensive (see section 9.22). MLST is the only real approach in a population genetics context, but population genetics is not the only this that matters. • Virulence factors (admittedly not yet well characterised) are what matter in causing disease, and population genetic studies by their nature will not be the best or only way to monitor for these. This is because the genes involved are often highly selected and mobile between strains in comparison with the population genetic framework. Thus in the case of *Escherichia coli* for example, it is far more important to identify strains carrying toxin genes than to have population genetics-based assessment of prevalent strains.	
	Recommendations 9.32 – 9.33	• Recommendation 9.32 is welcome. However, the lack of urgency in this recommendation, and its lack of linkage to the studies listed in sections 3.30-3.33, is a major weakness. Without such linkage these studies will still be unlikely to resolve the conundrum.	• Recommendation 9.32 text amended. Also see Annex F to the Report.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
CHAPTER TEN – Summary of conclusions and recommendations

From	Paragraph	Comment	ACMSF Response
University of Southampton (A2)	***Campylobacter* detection and typing** 10.59, 10.62, 10.63	• cross reference 9.19, 9.21, 9.29, 9.30, 9.32, 9.33, table 9.2, table 9.3	
Food and Drink Federation (A10) Society for General Microbiology (A11) Food and Drink Federation (A10 Society for General Microbiology (A11) Ulster Farmers' Union	**Measures to prevent *Campylobacter* cross-contamination** 10.45 10.47 10.48 **Organism, human immune response, and pathogenesis** 10.10 10.20	• Development of industry guidance to ensure a consistent approach to the generation of on-pack cooking instructions is supported. • Development of advice for caterers and public on the key safety steps to prevent infection is supported. • Recommendation is curiously worded: what does 'if necessary' mean? 'Wiping down' is probably microbiologically meaningless and even this is likely to increase contamination of hands and kitchen surfaces. • Steps taken in the kitchen to avoid cross contamination along with effective cooking practices are seen by the industry as key critical control points for preventing *Campylobacter* infection. • FDF's foodlink programme provides a focus for communicating messages on the importance of food hygiene to everyone preparing food. • Conclusions listed are better supported and argued than the points made in the summary. • The recommendation that serological markers for recent infection and prior immunity be developed is a 'wish-list' item, as there is little scientific evidence to suggest that it will be easy to define such markers. • Cross-reference to para. 4.58	• Support acknowledged. • Sentence deleted from the Report. • The ACMSF notes that the FSA annually provides support for this initiative.

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11)	**Measures to prevent *Campylobacter* contamination** 10.21	• The recommendation that the FSA should intensify its work with the poultry industry to achieve wider acceptance that *Campylobacter* control in housed birds is now possible is potentially controversial since it raises issues of economic cost versus benefit, and the difficulties of controlling and policing such measures. Also there is no proof that such control is effective (see summary comments on para 11).	
ADAS (A12)	10.27	• Understand that the industry-wide programme to spread 'good farming' practices and biosecurity is underway (poster campaign 2003?). Should this be mentioned in this 2nd draft report together with some initial assessment as to the initial effectiveness and/or feedback from the industry?	• See Annex F to the Report.
	10.28	• There is still a lack of empirical information as to the effect of thinning of broiler chickens on subsequent *Campylobacter* infection levels.	
		• The FSA have commissioned some R&D on the subject although the start date of this has been progressively delayed because of industry concerns regarding confidentiality. In the light of the importance placed on thinning with regard to the potential for *Campylobacter* transmission, we recommend the following:	• The ACMSF note that the FSA has commissioned research to provide detailed and practical information on best practice, which will enable publication of a code of best practice on thinning for the UK poultry industry.
		• There is an urgent need to collate information on the effect of thinning on *Campylobacter*, and the recently commissioned R&D trial should be started as soon as possible;	
		• Maintaining the goodwill and co-operation of the industry is vitally important to achieving improvements in both the short and longer term. As such, a pragmatic and sensitive approach to the disclosure of commercial information is required.	• The ACMSF note that the FSA has built strong links with stakeholders through consultation and development of the *Campylobacter* strategy.

From	Paragraph	Comment	ACMSF Response
ADAS (A12) (cont)	10.28 (cont)	• Without having first undertaken the R&D referred to above, it is difficult to see how the FSA can 'explore options for modifying thinning practices'. • Although the report does not specifically mention the 'economic pressures' on the UK industry, the extent of the financial pressures coupled with the chronic nature of these difficulties cannot be over emphasised. • Phasing-out thinning or implementing any changes that would incur (significant) additional cost would effectively sound the death knell for commercial broiler production in this country.	The ACMSF note that the FSA has commissioned research to provide detailed and practical information on best practice, which will enable publication of a code of best practice on thinning for the UK poultry industry. • The ACMSF recognised these difficulties (see 4.21) and recommend research into measures to operate 'thinning' more hygienically. • As above.
	10.29	• The need for urgent improvement in crate washing & other biosecurity measures is fully supported but has the relevant research been completed and if so, are the results and recommendations available to the industry?	• The ACMSF note that the FSA has produced a 'state-of-the-art' report. • Draft messages have been formulated to support FSA promotional activity.
	10.30	• It is assumed that imported chicken meat will not be free of *Campylobacter* contamination. Monitoring *Campylobacter* in 'retail chicken' is thought to be a sound and sensible practice if this enables the hygiene statues of imported chicken meat to be determined and monitored. This measure will also be welcomed by UK producers of chicken meat as it will demonstrate that the FSA are not 'singling out' UK production.	• See Annex F to the Report.

From	Paragraph	Comment	ACMSF Response
Society for General Microbiology (A11)	10.31	• Surveillance of extensive chicken production seems to be a crucial area in view of the public perception that traditional production methods are superior and potentially safer.	• See Annex F to the Report.
Scottish Food Advisory Committee (SFAC) (A18)	**Recommendations**	• These are well prioritised in Chapter 10 and provide strong guidance on the way forward. • Of particular concern is the lack of robust date on *Campylobacter spp*. incidence in other specific foods including other poultry meat, red meat, water etc and the urgent need for data in this area. • More research is needed on the infectious does in humans (which may be low), human immunity and the development of serological markers tested through epidemiological-robust, population-based studies to help establish asymptomatic infection, immunity in chickens, responses to Stress, seasonality, efficacy or otherwise of processing aids, post genomic and functional genomic research.	• The ACMSF recommends wide-scale surveys for *Campylobacter* in other poultry and red meat (10.36 & 10.41).
Society for General Microbiology (A11)	10.51 ***Campylobacter* detection typing** 10.62	• There seems to be little hard information about the occurrence of *Campylobacter* in domestic pets and it may be preferable to learn more about this before recommending precautions that may not be necessary. • There are numerous academic laboratories 'capable of applying MLST', but presumably this recommendation refers to those that operate in the public and environmental health ambit.. MLST is assumed to be the 'gold standards' epidemiological typing pool. Although some members of the scientific community have reservations, it appears to be the best typing technique currently available.	• There is evidence from *Campylobacter* sentinel surveillance that pet ownership is a potential risk factor. Report text amended.

GENERAL COMMENTS

From	Topic	Comment	ACMSF Response
University of Southampton (A2)	Emerging species	• Most laboratories use inappropriate culture recovery techniques for clinical, food and environmental samples that positively discriminate against isolation of emerging species and favour *C.jejuni* and *C, coli.* Strong bias that *Campylobacter* thermophilic *C jejuni*. • (note that report continually uses *Campylobacter* when authors probably mean *C. jejuni*).	• Introductory text to the Report amended (para 1.1).
Poultry Health (A4)	Immunity Chapter 2 Biosecurity Cross contamination	• Only covered in one para (2.18) with only one recommendation, but this could be an important aspect in the occurrence of cases • Chapter 2 concentrates on the negative impact of the immune system, though paras 4 & 5 of the research memo go some way to address this point. Do we know the impact of heat-inactivated *campylobacter* antigens in food on immunity? A validated serological test for immunity, would allow examination relatively simply. • A *Campylobacter* control programme in the poultry industry could be very expensive so it would be prudent to understand these issues urgently. • Disappointed to see limited emphasis on carcass treatments. Also minimal discussion of potential impact of packaging. Improved packaging to avoid leaks and allow cooking with minimal contact with hands, kitchen surfaces etc could have substantial impact. • Requirement to freeze carcasses would have major economic impact on poultry industry. Minimal evidence that Scandinavia control programmes based on on-farm control have had a significant impact on human *campylobacter*iosis. Recent view from Denmark is that flying insects are a likely vector into poultry buildings and they are experimenting with screens.	• The ACMSF note that the FSA consulted stakeholders including poultry industry during development and implementation of *Campylobacter* Strategy. • (see suggested footnote on page 28).

From	Topic	Comment	ACMSF Response
Poultry Health (A4) (cont.)	Biosecurity	• Law of diminishing returns in terms of the commercial benefits obtained. The likelihood of exclusion of a pathogen will depend on the level of infection present in the immediate environment and the diligence with which it is applied. • Evidence the dry litter is negatively correlated with *Campylobacter* infections in chickens makes sense. Poultry litter is highly toxic to many micro-organisms.	
British Poultry Council (A6)	Omission	• In UK, more than half the chicken breast meat consumed is imported. We see little in the Report on how this impacts on the levels of *Campylobacter* infection in humans or on what measures might be taken to remove this risk.	• The Report focuses on UK produced chicken as this represents a significant proportion of chicken on sale in the UK and the FSA can predominately influence UK production. The ACMSF request the FSA to take similar matters forward in the EU (see summary point 13).
Society for General Microbiology (A11)	Omission Membership of Group	• Report concentrates on chickens as a source and says little about the contribution made by turkeys and ducks. • Committee appears unbalanced, in that it includes relatively few active scientists in comparison with the numbers of officials and representatives of industry and public bodies. • The UK has a highly productive and expert academic community researching into *Campylobacter*, representing perhaps the leading country internationally in this field and few of these scientists appear to have been consulted in the preparation of this report. There is, therefore, a risk of insufficient scientific expertise being brought to bear on what is a complex problem with much scientific uncertainty.	• Report has focussed on the major part of poultry market as this is where the greatest impact of any intervention would be felt. See Chapter 6. • The Working Group had representatives from all sectors and the Report was reviewed by full committee prior to publication for consultation. • The programme of work included a workshop that involved leading scientists and the Working Group also received presentations from universities.

From	Topic	Comment	ACMSF Response
Ulster Farmers' Union	Poultry as major source of human *Campylobacter*	• There is strong circumstantial evidence suggesting poultry as a major source of human *Campylobacter* infection. • Agree that the FSA must work with industry stakeholders in developing practices which will reduce the risks posed by *Campylobacter*. • However the industry should be given time and support to help them meet any targets set for reducing *Campylobacter* infection.	• The ACMSF note that the FSA are working close with industry stakeholders to develop and implement *Campylobacter* Strategy and Biosecurity Campaign.
The Halal Food Authority (A14)	Awareness	• Programmes should be devised and publicity made for creating in the Pakistani community (the largest provider & consumer of meat and poultry in halal sector of UK) to orientate them that they are more prone to be infected with bacteria than any other ethnic minority. And only strict regime of hygienic controls would thwart the fears of spread of these bacteria or other food-borne illnesses that could be a cause of a communal calamity. • Since boneless chicken is the poultry meat that is most in demand and, its imports top all meats as far as tonnage of imports are concerned, either halal or otherwise; these should be checked, monitored and regulated through out the chain from feed to slaughtering, packaging, storage and transportation.	• As part of the Food Hygiene Campaign initiative, the ACMSF note that food hygiene leaflets aimed at caterers were published in a series of languages including those for the Pakistani community. • Imported poultry products are subject to specified community law including import checks.
National Council of Women of Great Britain (A17)	Cooking guidance Eggs Wild animals	• Recommends that FSA issue a leaflet for consumers giving information related to – cooking guidance – temperatures and times needed for cooking to eliminate the *Campylobacter* infection and information about *Campylobacter* in relation to imported products, particularly poultry. • There is much useful information about poultry meat in the draft report but no mention about the possibility of surface contamination of eggs from hens. Is it present or absent on eggs? • There are references to wild animals carrying *Campylobacter*. Does the term wild animals include birds?	ACMSF note: • FSA published information on preparation and cooking of meat. • FSA published research demonstrating presence of *Salmonella* on the surface of eggs. FSA has also issued advice to consumers on handling, storage and cooking of eggs. • Report text amended.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES
GENERAL COMMENTS (continued)

From	Topic	Comment	ACMSF Response
EFSA	EFSA	• It is imperative that the European Food Safety Authority (EFSA) is consulted to establish a Europe wide programme for biosecurity of poultry meat. As much poultry meat in the UK is imported from outside the EU countries, other methods of developing International co-operation are required.	• See Annex F to the Report.

ACMSF – CONSULTATION ON THE SECOND REPORT ON *CAMPYLOBACTER* – TABLE OF RESPONSES RESEARCH MEMORANDUM

From	Paragraph	Comment	ACMSF Response
University of Oxford – Department of Zoology and The Peter Medawar Building for Research (A7)	General	• Important to make explicit that the Memorandum covers longer perspective research and that many of the research opportunities and areas which might make the greatest and most rapid impact are scattered through the main report. • It may be useful to extract an overall set of research recommendations that covers research as a whole.	
Food and Drink Federation (A10)	Research	• FDF considers that there is scope for more research on control methods for *Campylobacter* such as competitive exclusion and phage therapy. • Research is also needed on other possible routes of transmission of *Campylobacter* such as by water and by pets.	• ACMSF have advised that more work is needed in these areas (7.38).
Ulster Farmers' Union (A13)	Research	• Agree that more research is needed on the *Campylobacter* status of extensively reared chickens.	