

Food Standards Agency

Citizens' Forums - Campylobacter

TNS-BMRB Report

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Executive Summary

Shopping habits

There were a wide range of factors that influenced purchasing decisions among respondents, however four key factors emerged as having a consistent influence while making decisions about buying meat.

Cost and value for money. This was an important factor for all consumers but was a critical issue for families with children still at home and those shoppers who were on a tight budget. The influence of cost and value for money had become even more important since the economic downturn with consumers on low incomes feeling under increased pressure to save money.

However, those with higher disposable incomes spend money on purchasing more expensive merchandise that they perceived to offer some sort of added value or health benefit such as free range or organic products. Consumers would also be influenced by buy one get one free deals available at many supermarkets in order to get the best value for money. These deals would frequently be the key motivator in getting them to try new products.

Habits and convenience. Consumers want to spend as little time as possible thinking about what food to buy and how to prepare it. Therefore they relied on prior shopping habits to help them save time. Brands acted as a signpost for quality and what a consumer could expect from a product and meant that while a consumer may not have purchased this particular product before it would embody the qualities of products they had purchased in the past. Intra-store brands acted in a similar way and labels such as 'finest' or 'basics' helped consumers to make similar decisions.

However, habits could also have a negative influence and consumers could be fooled into thinking that because there had been no negative outcomes in the past that low quality products from low quality establishments were unlikely to have any negative outcomes in the future.

Quality. Consumers' perception of quality was especially important when it came to meat products where the potential risks to health were perceived to be greater. Consumers used visual checks of the packaging and contents in order to determine

the quality of the product as well as comparing three or four similar products to ensure they had chosen the best one. However, consumers were also aware that producers could use additives in order to make the meat available for sale at the supermarket look good. This was a concern for consumers who were worried about the potential hidden health consequences of these additives. Meat also had to be fresh in order for it to be thought of a good quality and consumers often used sell by dates to discern how fresh a product was.

Origin. Respondents liked to buy local or British products whenever possible as this was perceived to be of the highest quality. The reasons behind this perception was that it had travelled less distance, the quality checks employed in this country would be of a very high standard and UK farmers used the best farming techniques.

The EU and other developed countries were thought to produce high quality meat as they were perceived to employ similar safeguards to the UK. However, consumers were more dubious about production standards in other countries as they were less likely to be as stringent as the UK. However the supermarkets were regarded as food guardians who would ensure that this food was safe to eat.

Buying and handling Chicken. While there was a good level of awareness of the potential health risks related to chicken if it wasn't stored, prepared and cooked properly there was little awareness about *Campylobacter* and its effects. Consumers thought of themselves as competent at handling chicken although they were less willing to think of others in the same terms unless they were a trusted individual.

Respondents in the workshops had all developed their own set of rules when it came to preparing and cooking chicken and this frequently differed, if only slightly, from accepted best practice. This was because past behaviours had become ingrained in their food preparation routines and they were not prepared to change these even when they discovered they could be counter-productive to food safety.

However, respondents did have a range of widely accepted strategies to deal with the risk of cross contamination including washing hands and surfaces thoroughly, not using the same chopping board or knife for chicken and other ingredients, storing chicken at the bottom of the fridge and ensuring that chicken is cooked thoroughly.

Informing the public about food safety

Respondents recognised that the public received information on handling chicken hygienically from a diverse range of sources. Due to the perceived complexity of information available, people tended to select simple practical rules. As a consequence, respondents believed that the public may ignore new information or advice that contradicted rules they had adopted.

Informing the public about *Campylobacter* may discourage people from purchasing fresh chicken. Therefore, the public may respond better to practical advice about safe handling of chicken particularly on how to cook chicken properly and avoid cross-contamination. Respondents thought that this information should be delivered in stores and supermarkets, either on labels or information leaflets. Supermarkets may be more willing to provide advice on cooking chicken hygienically as publicising *Campylobacter* may discourage consumers from buying fresh chicken.

Respondents expressed a preference for a Government backed campaign to inform the public about safe food hygiene practices and to raise awareness about consumers' personal responsibility to protect themselves. Consumers may be more likely to act on information distributed through trusted sources such as schools and GP's surgeries because these organisations were perceived to be motivated by an interest in public health and welfare. Respondents suggested that it was important that young people were educated about food hygiene. This was considered to have a dual effect. It equipped those individuals for later life and information may filter back to their parents.

However, respondents thought that educating the public about safe food handling practices was not sufficient to reduce the incidence of *Campylobacter*. There were three factors which contributed to this view. Firstly, habit had a strong effect on behaviour. Therefore consumers may ignore information which differed from their usual practices. Secondly, there was a concern that it may be difficult for consumers to recognise where cross-contamination had occurred in supermarkets or at home, regardless of whether they were informed about the risk. Finally consumers may still be exposed to contaminated chicken when eating out. Therefore, respondents supported measures designed to reduce levels of *Campylobacter* alongside a public awareness campaign.

Overarching themes when considering Interventions

There were several issues which influenced respondents' views about each of the interventions including the effect on consumers' experience; food safety issues; associated costs and the wider ethical concerns.

Consumer experience: The potential effect on the appearance smell, and taste of the chicken was of concern to respondents. The appearance of chicken was considered a good indicator of the 'quality'. Therefore, respondents thought that interventions that effected appearance may dissuade consumers from purchasing fresh chicken. There was concern that processing interventions, including chlorine washes, earlier slaughter, lactic acid spray and freezing would affect the taste, smell and texture of the meat. Consumers expected chicken to taste a particular way and respondents felt that any change to this would be unpopular. However respondents believed it was unlikely that retailers would sell produce if the effect on taste and quality was significant. Preparing frozen chicken was considered inconvenient because of the length of time necessary to defrost the meat. Restricting thinning and earlier slaughter were also considered to effect convenience for large families who would need to store and cook two or more birds.

Food safety: The terminology used to describe interventions may have a considerable impact on views about food safety. Terms which suggested that 'chemicals' would be left on the food were considered likely to cause concern. Therefore, respondents suggested that 'chlorine washes' could be renamed 'washed' or 'hygienically washed'. 'Irradiation' may be of particular concern to the public because of associations with cancer treatment and radiation poisoning. Therefore respondents said they favoured 'cold pasteurisation'. Respondents were also concerned that interventions would not be adhered to abroad in the same way that they are in the UK and therefore there would still be a risk of *Campylobacter* from imported chicken. There may also be a lack of knowledge about how to handle frozen chicken safely. Key areas of uncertainty were how to defrost chicken safely; how cooking times need to be adjusted; and how long a chicken can be left to thaw before it is unsafe to return it to the freezer.

Cost versus benefit: Cost was considered to be one of the principle factors which shaped purchase decisions for consumers. Therefore, a key concern for respondents was the effect that each of the interventions would have on the price of chicken. Generally, respondents supported the idea that the public would accept a minimal price increase in order to ensure food safety. However, the thresholds of what was deemed to be a 'minimal' increase varied between respondents according to their income.

As it was possible to eradicate *Campylobacter* entirely by cooking chicken properly, respondents questioned whether the benefits of interventions to reduce *Campylobacter* justified the cost. Therefore, respondents expressed a preference for interventions which would have the least effect on cost to the consumer.

Wider issues / concerns: Respondents were conscious that there may be wider ethical issues such as the impact on at risk groups, environmental issues and the burden placed on farmers. However, the impact of these concerns on respondents' decision to support or reject an intervention was limited because they tended to prioritise protecting public health, affordability and quality over the impact on the environment and farmers.

Conclusions

Respondents recognised that *Campylobacter* presented a significant public health risk and therefore they supported interventions designed to reduce the incidence of the bacteria in chicken sold to the public. Interventions to reduce *Campylobacter* would be reassuring to consumers. However, it would be important to promote hygienic handling of chicken to ensure that the public do not become complacent about their responsibility to protect themselves.

Farming: Respondents were not confident that it would be possible to prevent *Campylobacter* from entering broiler sheds, particularly if thinning practices continued. Therefore, respondents would support maintaining and standardising bio-security measures but would reject additional measures which would increase the pressure on farmers.

Processing: Lactic acid spray and steam and heat treatment received the greatest support as these interventions were considered more natural than irradiation and

chlorine wash. Although freezing was considered familiar and effective, due to concerns about the impact on convenience and quality respondents felt that demand would be low.

Packaging: These interventions received the greatest support from respondents as they reduced the risk of cross-contamination and these interventions were thought to have a minimal effect on cost and the quality of the meat.

The effect that each of the interventions had on convenience, cost and public concerns about 'processed foods' – particularly chemical treatments and irradiation – may be prioritised over their effectiveness in reducing levels of *Campylobacter*. Therefore, only the interventions which were considered to be inexpensive and which would have a minimal effect on the product received the strongest support across groups. It would be important to consider how products are labelled and the terminology used to describe these interventions in order to ensure they do not discourage consumers from buying the products.

1. Introduction

1.1 Background

In December 2005, the Food Standards Agency (FSA) Board agreed to develop more creative and experimental ways of engaging directly with individual consumers and to construct a new model for consumer engagement. Central to this aim was the establishment of a nationwide series of consumer forums to enable the FSA to establish an ongoing dialogue with the public on food standards.

The forums provide the opportunity for the FSA to innovate in the way it makes decisions to protect public health and consumer interests in relation to food safety. In particular, the forums help to frame issues the FSA focuses on, and ultimately the advice its gives, from a consumer perspective.

Specifically, the forums aim to:

- Understand the “top of mind” concerns of UK consumers.
- Develop deeper understanding about particular concerns that consumers have in relation to food.
- Test FSA policy and ensure that the views of consumers are taken into account at all stages of the policy making process.

This report outlines findings from year three of the citizens’ forums which explores consumer awareness and understanding of Campylobacter and the risks associated with it as well as examining the options for reducing the levels of this food borne disease.

1.2 Research Aims and Approach

The following aims were identified for the research:

- To explore whether raising consumer awareness about Campylobacter would be a useful strategy in assisting consumers to take food safety issues more seriously
- To discuss a range of interventions that have the potential to reduce the incidence of Campylobacter in poultry and deliberate on the potential risks and benefits

- To understand whether these interventions are acceptable to consumers and the extent to which they find them desirable

The approach adopted to address the aims involved a series of ten workshops across ten areas of the UK, convened over three waves. Each workshop comprised ten participants and lasted two hours.

The discussions in the workshops developed in relation to a topic guide (see appendix 2) and specifically explored the following areas:

- The extent of consumer knowledge about Campylobacter and how to handle poultry safely
- Consumers' information needs in relation to Campylobacter
- How consumers make decisions while shopping for food with a focus on what influences decisions when buying meat products
- An explanation of how poultry goes from 'farm to fork' and the interventions that could be introduced to reduce the incidence of Campylobacter
- Consumers' attitudes to the interventions and the potential risks and benefits
- How best to pay for the interventions and who should provide this funding

Each group was moderated by an independent facilitator, and representatives from the FSA were also present, both observing and adding clarification in discussions where respondents required it. At the start of the first workshop respondents were shown a film describing the process that is used to take chickens from the farm to the supermarket and the associated Campylobacter risks inherent at each stage. Stimulus materials were also used to aid discussion and provoke debate (see appendix 3). The findings were subject to a full analysis, which forms the basis for this report. A full methodology can be found in appendix 1.

1.3 Report Outline

The next section of this report discusses consumers' shopping habits and the factors that influence their decision making. Chapter three looks at informing the public about Campylobacter. Chapter four examines factors which influenced consumers' views about interventions to reduce Campylobacter. Chapter five then discusses

summarises respondents' views about each of the interventions. Finally, chapter six pulls together the findings from all three waves.

2. Shopping habits

The first workshop started with a discussion on respondents shopping habits and how they made decisions about the food purchases that they made. There was a wide range of factors that affected decision making depending on the product that they were purchasing, what they were planning to use the product for and who would be eating it. However the key reasons behind the majority food choices that respondents made was cost and value for money.

While cost and value for money was important to some degree for all respondents, it was most important for those who were shopping on a tight budget, especially those who had a family to provide for. Respondents in this situation said that cost had always been a key factor for them but that it had become even more important since the economic downturn. However, those on a budget said that while they bought supermarkets' basic products, these were also often regarded as healthy options and a way of getting 'cheap protein' in their own and their children's diets.

"[What's important] Right now [is] price. [...] It's not always been like that, but it's just getting tighter and tighter, so [getting] cheap protein into my family's diet is important." (Manchester, male)

Similarly, special offers and 'buy one get one free' deals would also affect purchasing decisions if these could offer value for money on what consumers perceived to be good quality products. These special offers were frequently mentioned as the key factor which could persuade consumers to try new products rather than make purchases based on habit.

While value for money was an issue for all respondents, it was less of an issue for those who had higher disposable incomes. These respondents were more likely to buy luxurious items as a special treat or more expensive items that they felt had added value or health benefits, such as organic or free range products.

While all respondents stated that they would like to purchase this type of higher value products on a regular basis, for most this would mean having to make sacrifices in relation to other areas of their food shopping which was perceived to result in a 'net loss' in terms of value for money. Respondents thought that this made it very difficult

for them to justify spending the extra money when very similar products could be purchased for significantly less. Therefore, these respondents tended to only purchase these higher value products on special occasions or to treat themselves.

“Yes, I don’t like free range prices, I’d like to buy it but I can’t bring myself to hand over that kind of money for it, it’s very expensive, I’d never go for the very basics, I’m sure it’s kind of bits scraped up off the floor, somewhere in the middle I think I’m happy with that. I’d be angry with myself if I bought the free range, I really would be.” (York, Male)

Respondents thought that a lot of what drives consumer decisions when buying food was based on convenience and shopping habits. It was assumed that consumers would want to spend as little time as possible thinking about what to buy and making those purchases. Therefore, it was important that most shopping could be done in one place in order to minimise the number of shopping trips that needed to occur.

Additionally, consumers would predominantly want to buy products that were simple to prepare as most respondents did not want to regularly spend too much time preparing or thinking about how to prepare their meals. Therefore, they stated that they habitually bought products which they either knew how to make, if working to a recipe, or they knew would be easy to prepare, if buying ready-made meals.

Brands were also an important factor when deciding on which products to buy. This enabled consumers to make quick judgements about the quality of specific products which they had not previously bought. Consumers would know what to expect from a Bernard Mathews product for example and could therefore make a decision based on previous experience of other products made by this manufacturer.

Respondents did not associate specific brand names with the quality of fresh meat products although there was a hierarchy of quality in the fresh meat and poultry products that supermarkets sold with some supermarkets perceived to source higher quality products than others. Respondents said that they also used the supermarkets’ own range branding to help them in their decision making, with basic, finest and organic ranges used to signpost them to suitable products without having to spend the time performing their own quality checks.

However, habit could also lead to consumers taking risks with their food. Respondents stated that they frequently bought what they considered to be low quality products from take-aways or other less responsible retailers and would frequently ignore the recommended guide lines when it came to cooking or storage. This behaviour stemmed from a belief that safety was almost guaranteed where past behaviours had not resulted in negative outcomes.

Beyond the influence of habit and cost, respondents thought that consumers were most likely to be affected by their perception of the quality of a product, especially meat products which were perceived to present a greater risk to their health. There were a number of factors that affected a consumer's perception about the quality beyond those already discussed but these primarily centred on a visual inspection of the product. Respondents thought that consumers would be put off purchasing a product where the packaging was damaged or was of a low quality.

“If the outside of the packaging doesn't meet my standards why should I expect [what's inside] to be any better? [...] It seems to me that if it looks bad for you, then it probably is.” (Portsmouth, male)

Respondents thought that consumers would also place a lot of emphasis on how the actual product inside the packaging looks and with relation to meat would frequently judge factors such as the colour and the texture by lining up several similar products and selecting the best looking one. This would also provide a sense that they had got the best product for the price.

“I think you've got to be choosy, when you go to the supermarket, when you're buying. Whatever you're buying, I think you do that instinct thing, don't you? You choose what you think is right.” (Manchester, female)

Similarly, when eating out, consumers were thought to make judgements about food based on the appearance of the restaurant and how clean it looks. There was a perception that if the restaurant wasn't clean and tidy then this was likely to be reflected in the areas used for food preparation and the working practices of the staff.

Respondents also thought that supermarkets employed techniques to improve the appearance of meat in order to encourage them to purchase it. There was concern that some producers were using growth hormones to make the meat look more

appealing and some respondents thought that these additives could possibly have wider social consequences, with some respondents thinking that they could be responsible for an increase in cancer and obesity. However, this was thought to be a problem that affected low cost / low quality processed foods while higher quality products were thought to be less at risk from these problems with the meat sourced from local butchers thought to be least likely to contain any of these additives.

Purchasing food that was perceived to be fresh was very important when buying products such as fruit, vegetables and meat. Respondents said that ensuring the meat they bought was fresh was a primary concern in relation to the perceived quality of the product. Therefore, the longer fresh meat had before it's sell by date the better quality it would provide.

"I always pick up chicken in a container off the shelf and check the sell by date [...] you get a good idea of how fresh it is" (Glasgow, female)

Freshness was also an important factor to consider in relation to the food safety risks that meat which had past its sell by date could present. It was thought that food poisoning that resulted from eating bad meat would be much more serious than from other products and that the food poisoning risks arising from Pork and Chicken in particular required careful attention. This sentiment became even more acute when consumers were buying food for others such as children or elderly relatives, for whom food poisoning could present a very serious risk.

The origin of a meat product was also linked to the perception of its quality. British produce was perceived to be of the highest quality, with locally source meat, where appropriate, being considered to be the best. This was due to a number of factors including distance travelled, quality checks and farming standards. On the whole, countries within the European Union (EU) and other developed nations such as New Zealand and Canada were also thought to have similar production standards to the UK. Therefore, these sources were also considered to offer high quality produce, even if it had to travel long distances to reach the supermarket shelves.

However, produce from outside these countries was considered to have more variable levels of quality primarily because many budget products were perceived to originate from these countries.

“A lot of the cheap stuff you see in [Supermarket] comes from places like Thailand doesn't it? All those cheap prawns and that party pack stuff [...] it's got to be cheap for a reason you know.” (Plymouth, Female)

However, consumers did think that although the production standards within these countries were likely to be less stringent than in the UK, the supermarkets would ensure that high levels of quality would be maintained for fear of having their reputation damaged.

“it's going to come back to them if somebody is going to get seriously ill and sue them, so it might go back to the [supermarkets].” (Aberdeen, female)

2.1 Buying and handling Chicken

There were low levels of awareness about *Campylobacter* among consumers specifically, although consumers did have an acute awareness of the potential health risks related to chicken if it wasn't stored, prepared and cooked properly.

Respondents felt that this awareness had resulted from the many television programmes about chicken in the recent past. However, the most well known risk was *Salmonella* with respondents saying that extensive media coverage of the issue in the past had raised awareness among the public.

While consumers think of themselves as competent at handling and cooking chicken they are not entirely confident that others are either as competent or contentious as themselves. Respondents stated that they were sure that chefs in restaurants would cut corners in relation to food safety when they were in a rush, although they had no evidence to support this. However, they thought that consumers could rely on their senses to tell them if the chicken had been prepared and was cooked properly.

For respondents, the rules they used to ensure chicken was stored, prepared and cooked properly frequently differed, if only slightly, from accepted best practice. This was frequently because past behaviours had become ingrained in their food preparation routines and there was an attitude that as it had never hurt them in the past then it was unlikely to in the future or because they had learned this technique from a trusted source in the past.

“My wife always washes chicken [...] she says she just wouldn’t want to eat it unless she thought it had been cleaned first” (Portsmouth, male)

lime, that’s the way I was brought up and then when I wash it in the sink I always use a disposable glove and then I spray it down with Flash” (Nottingham, female)

However, respondents did have a range of widely accepted strategies to deal with the risk of cross contamination from chicken and were acutely aware of the risks of spreading bacteria around the kitchen. The methods most commonly employed were:

- Washing hands and surfaces thoroughly before and after preparing chicken
- Not using the same chopping board or knife for chicken and other ingredients
- Storing chicken at the bottom of the fridge
- Ensuring that chicken is cooked thoroughly

Respondents were less alert to the risks from cross contamination outside of the home and were surprised to find out that consumers could spread bacteria around a supermarket by handling fresh chicken products while shopping.

3. Informing the public about food safety

Although respondents recognised that the public received many messages about food safety from a range of different sources, they thought that the public lacked a consistent understanding of food safety and practical ways to avoid food borne illness. Consequently, there was a perception that the public were not well informed about food safety issues because messages about food safety were not consistent.

Information and advice on handling chicken came from a diverse range of sources and therefore individuals adopted different behaviours which they considered to be safe rather than acting on a single message about handling chicken hygienically.

For example, practices learnt from parents were considered to have had the greatest impact on people's behaviour and practices learnt from parents were likely to become habitualised. However, external influencers also impacted people's behaviour and views about food hygiene and respondents were aware of TV ads, which provided advice about handling food hygienically. These included ads by the FSA and ads for cleaning products such as kitchen sprays. People's behaviour may also be shaped by events, such as E.coli and Salmonella outbreaks, which led to greater coverage in the media. These events raised awareness about maintaining hygiene standards – i.e. regularly washing your hands or ensuring food is cooked properly. Respondents believed that the public were already aware of safe food handling practices but that media coverage of food safety issues ensured that the public maintained these.

Although the public may be aware of the practical steps they should take, such as washing their hands and storing raw meat away from cooked food and fresh vegetables there was a view that people may not have a clear sense of the food safety issues, such as bacteria contained on foods and the risk of cross-contamination which underlie these precautions and therefore these may not be maintained.

“people might put [...] yoghurts and stuff at the top of the fridge and raw meats and stuff at the bottom [...] but do they know why they are doing it and if there's

no room for something where it goes do they just jam it somewhere else anyway [...], I think a lot of people do know that they take the risks anyway. So maybe just having more reasons why they should not take those risks.”

(Nottingham, female)

Respondents thought that, due to the amount and perceived complexity of information available, people tended to select simple practical rules about how to clean, store and cook chicken. As a consequence, respondents believed that the public may ignore new information or advice that contradicted rules they had adopted.

3.1 Informing the public about Campylobacter

Although the public understood that it was important to be more cautious when preparing chicken compared to other meats, awareness of Campylobacter was low. There was some support for raising awareness about Campylobacter as respondents believed that this would encourage people to be even more cautious when cooking and handling chicken. However, respondents were concerned that raising awareness about a particular bacterium may discourage the public from purchasing chicken in the future.

“We have got to be very careful because if we say to the public about a new bacteria everyone will start panicking and stop buying chicken” (London, Male)

Informing respondents about Campylobacter was found to have a limited effect on shopping habits and food preparation behaviour between waves 1 and waves 2. Respondents said they chose smaller chickens or frozen chickens as they believed these were less likely to carry Campylobacter. Respondents also checked whether liquid was leaking through packaging or whether the packaging was damaged. They were also more conscious of labelling, particularly they looked for cooking instructions or information on storage and handling chicken because they were more aware of the need to cook chicken thoroughly and avoid cross-contamination. Respondents also suggested that they were more cautious about how they handled chicken, in particular they were more aware of the risk of cross-contamination by ensuring that chicken was wrapped properly, they used anti-bacterial spray on surfaces, separate chopping boards and stopped washing chicken before cooking it.

I think it made me more careful about what I was doing with the chicken when I brought it home [...] this bug is everywhere, but if you cook the meat properly then you're not in any danger, the danger is transferring the germs whilst it was in the fridge" (Glasgow, Female)

However, respondents were sceptical about the benefits of informing the public – who had not received the information they had - about Campylobacter because they were concerned about the effect that this would have on the public perception of chicken producers. In addition, respondents believed people would be reluctant to change their behaviour unless they thought they were at risk from the bacterium.

"I don't think it's helpful to tell them specifically about Campylobacter. I think it's helpful to tell them that if you don't cook it properly and if you don't observe hygiene standards, then you will end up ill" (Female, Manchester)

Respondents recognised that the public had avoided meat products in the past due to coverage in the media of other food borne illnesses such as CJD, E.coli and salmonella. Therefore, they believed that it was likely that more information on Campylobacter would scare the public and create a 'national panic' which was unwarranted.

Respondents were also concerned that focussing on the presence of bacteria, rather than ways in which the consumer could protect themselves, may also reduce the sense of personal responsibility. As it is possible to reduce the risk of Campylobacter by cooking chicken thoroughly, focussing on what consumers can do to protect themselves, rather than highlighting Campylobacter as a fault with the chicken, would emphasise the public's responsibility to protect themselves.

"Nobody's going to stand up and say 'I know I didn't wash my hands and that's why I got it' [...] they are just going to say 'there's something wrong with the chicken'" (Belfast, male)

Educating consumers about Campylobacter may have a limited effect on their behaviour because they placed considerable trust in their own experience and did not consider that the level of risk was high for them personally. Respondents believed that if they cooked chicken thoroughly and were careful to avoid cross-contamination then they were not at risk of contracting Campylobacter. Respondents

also suggested that they did not consider that the level of risk was high because they had not contracted *Campylobacter* themselves, were not aware of others who had contracted the disease or had seen any news coverage in the past.

“I’ve been buying chicken and cooking chicken for about 50 years now and I’ve never had that, and I hadn’t heard of it. So I feel that as things are, I feel quite satisfied (Aberdeen, female)

3.1.1 Preference for advice about handling chicken safely

It was considered likely that the public would respond better to positive messages about practical ways that they could protect themselves from *Campylobacter*. Respondents felt that people were more likely to read and act on advice that was *short and sharp*, meaning it provided a simple, practical and succinct message.

“They just want to see the salient points, don’t do this, don’t do that, be careful with that, and that’s it” (Cardiff, male)

Respondents thought that it would be sufficient to provide information on how to cook chicken properly and avoid cross-contamination because cooking thoroughly eradicated the bacteria on the chicken and therefore it was only through cross-contamination that people could contract the illness. However, there was a concern that people were less aware of cross-contamination and, as it was difficult to notice when this had occurred, respondents thought this presented considerable risk.

“Everyone knows to chill it, everyone know how to cook it, or they should know and I think it is the cross-contamination is the thing people aren’t sure of” (Belfast, female)

People may need clearer guidelines on the meaning of ‘*cooking thoroughly*’ and practical ways to judge that chicken is cooked. Although the packaging often contained cooking instructions, respondents indicated that there was some anxiety about how to judge cooking times. There may be a need for information on cooking scenarios which were less familiar, for example a BBQs, and calculating cooking times for chicken breast versus portions and the whole chicken.

Information on food labels

Food labels were thought to be difficult to read because they contained a lot of information and the print was small. Consumers did not want to handle packaging where liquid from the chicken carcass had soaked through the labels because they were aware that this may spread bacteria. This also meant that it was more difficult to read labels.

“The trouble is, of course, you unwrap the chicken to get at the instructions and you’re spreading chicken juices everywhere and you’re getting them all over your hands” (Nottingham, female)

Respondents were also concerned that accessibility issues relating to containing too much information on packaging particularly for elderly people or where English was not a person’s first language. Respondents suggested there may be potential to develop visual diagrams to communicate food safety information.

Preferred sources of information

Respondents thought that it was important that there was consistent information about the risks of *Campylobacter*, available in store, such as leaflets or information on the packaging. However, they believed that supermarkets would be opposed to publicising *Campylobacter* because they were concerned that this may discourage consumers from purchasing chicken. Therefore, it may be necessary for the Government to promote and possibly subsidise the provision of this information. However, respondents did think that supermarkets may consider publicising ways to cook chicken more hygienically as this would avoid scaring customers while still promoting the message.

Teaching young people about food hygiene was considered to have a dual effect. It equipped those individuals for later life when they may be preparing food for others and information may filter back to their parents. Respondents said that ‘food hygiene’ was the first thing taught to pupils in the Home Economics they had experienced, but some were unsure whether this was still taught in schools. There was also a view that it was important to educate people when they were likely to start spending more time cooking for themselves and therefore suggested targeting university students and children in their late teens.

Consumers may be more likely to act on information distributed through trusted sources such as schools and GP's surgeries because these organisations were perceived to be motivated by an interest in public health and welfare. In contrast, respondents thought that the public may not trust information from supermarkets as they were considered to be motivated by profit.

Respondents expressed a preference for a government backed campaign to raise awareness about food borne illness in general and focussed on practical ways for consumers to protect themselves such as not washing chicken, check cooking times and storing chicken at the bottom of the fridge. However, respondents were strongly opposed to informing the public specifically about *Campylobacter* which was likely to alarm the public.

“As far as I'm concerned, you just treat chicken as carefully as you can to combat all of them. Not in particular Campylobacter. You just don't... you don't single any bacteria out or issue out; you just treat it all the same and treat it carefully.” (Manchester, male,)

Respondents suggested that a government sponsored campaign, including TV advertising or documentaries, was necessary to raise public awareness about the need to handle chicken hygienically. There was a perception that this should be Government sponsored for two reasons. Firstly because the public was more likely to trust information from an impartial government source like the FSA or NHS and secondly because there was a view that cost savings in the NHS due to improvements to public health would justify the cost of the campaign.

3.2 Preference for education alongside processes to reduce *Campylobacter*

Although there was considerable support for providing more information to consumers about food safety, there was a view that education should be combined with measures designed to reduce levels of *Campylobacter* in chicken. There were three key issues which led to the perception that education in isolation would not be sufficient to protect consumers from *Campylobacter*:

- Effect of habit on behaviour

- Risk of cross-contamination
- Eating out

Effect of habit on behaviour: Respondents believed that it only required ‘common sense’ to handle chicken hygienically. People who regularly purchase chicken were particularly unlikely to read cooking and handling instructions as they believed that the way they usually cooked chicken was correct even if the advice on the packaging was different. For example, habits, such as washing a chicken before preparing it, may persist despite receiving advice which contradicts this. Either because people would not notice or read contrary advice or would ignore this advice assuming it was targeted to less experienced consumers.

Cross-contamination: Regardless of whether people understand the risk of cross-contamination, respondents thought that it was more difficult to prevent cross-contamination than it was to ensure that chicken is cooked properly; particularly as cross-contamination can occur in the supermarket and consumers would not be able to identify where cross-contamination had occurred. As respondents ‘trusted’ their senses to judge whether meat was safe to eat, there was a concern that people may not notice cross-contamination.

Eating out: Educating the public about *Campylobacter* would not prevent people from ingesting contaminated chicken when eating out. Respondents thought that when people eat in restaurants they trust that safeguards are in place to ensure that the food is safe to eat and that best practice is maintained. However, respondents questioned whether food hygiene standards are maintained at all outlets. Ultimately, the public are not able to take action to protect themselves when eating out. Therefore, adopting measures which would reduce the prevalence of *Campylobacter* in chickens would protect consumers when eating out.

Respondents believed that it would not be possible to eradicate *Campylobacter* from all chicken. Therefore, it was considered important to educate the public so that they can reduce the risk of contracting *Campylobacter*. Respondents’ believed that consumers, food businesses and the Government had a shared responsibility for preventing *Campylobacter*. Each party had a responsibility at different stages of the process whilst the public held a personal responsibility to handle food safely after it was purchased.

“I think it is the retailer, the supplier and the buyer, you know, it is up to the supplier to make sure that the chicken is free of any bacteria, but having said all that it is important for the buyer to make sure that they maintain that standard of being bacteria free and it’s up to the person that is cooking the chicken to make sure that they adhere to the recommendations” (London, Female)

Whilst there may be limitations to the effectiveness of education campaigns on behaviour, there was little support for adopting a range of interventions without a public awareness campaign. This was because respondents believed that the public should be reminded that they had a personal responsibility to handle food safely.

4. Overarching themes

Respondents supported the view that interventions should be adopted which helped to minimise the incidence of *Campylobacter*, either by reducing the levels of *Campylobacter* present on fresh chicken or preventing cross contamination. However, respondents were also concerned that these interventions themselves may be “*controversial*”. There were several issues which affected respondents’ level of support for each of the interventions including: concerns about the affect on the taste and quality of the meat; food safety issues; associated costs; and ethical concerns such as the environmental impact.

4.1 Effect on consumer’s experience

Respondents were generally wary of interventions that they perceived would have a direct effect on their experience of chicken products and thought other consumers would feel the same. This was especially evident in terms of the sensory experience of choosing, cooking and eating chicken; whether preparing and cooking chicken was convenient; and the range of chicken products consumers would have to choose from.

4.1.1 Appearance, smell, taste and ‘quality’

Respondents placed a great deal of importance on how the interventions discussed would affect the quality of chicken. Consumers made judgements about quality based on appearance, smell and taste and therefore respondents were concerned by the effect that interventions may have on these features.

The appearance of chicken was thought to be a good indicator of quality. Whether they were purchasing meat from a supermarket, a specialist retailer such as a butcher’s, or at a restaurant, respondents said they judged the quality of meat based on how it looked. Concerns were raised that steam and heat treatment would alter the appearance of chicken which may dissuade consumers from purchasing the meat.

The affect that certain interventions, such as chlorine washes, freezing, earlier slaughter and lactic acid spray, would have on the taste and, to a lesser extent,

texture of chicken, were of key concern to respondents. However, respondents thought it was unlikely that retailers would sell products if the taste or quality was significantly compromised.

Respondents thought that interventions which affected the smell of chicken may discourage consumers from purchasing or consuming the product. The smell of chicken was considered to be important when deciding on which product to purchase, particularly when purchasing chicken from fresh meat counters in supermarkets and butchers. Although it was not possible to smell pre-packed chicken before purchasing it, respondents said they would throw away chicken based on the smell.

“And I took them home that night and I put them ... eight fillets in the freezer, cut open the two fresh ones and the smell came out, and I thought: oh God, these are off... I never got them [particular brand of supermarket chicken fillets] again, just because of the smell”

(Aberdeen, Female)

Respondents questioned whether slaughtering birds earlier would change the taste of chicken, much in the same way that veal tastes different from beef. Frozen chicken was thought have a different taste and be ‘tougher’ than chilled chicken. It was thought likely that ‘chemical treatments’, such as lactic acid spray and chlorines washes would affect the taste of chicken. When respondents were informed that chlorine washes could affect the smell of chicken, they were concerned that chicken would smell, and taste like chlorinated swimming pools.

4.1.2 Convenience and choice

Frozen chicken was considered to be less convenient than fresh chicken as it was necessary to leave sufficient time to defrost the bird fully. Therefore people would not be able to buy a chicken to eat that evening and this would be particularly problematic for people in full-time employment who may want to purchase ingredients for their evening meal after work. In addition, respondents felt that purchasing frozen chicken may also have consequences for storing the product, unless the consumer wished to defrost and eat on day of purchase. For example, some people mentioned that they only had small freezer compartments within their fridges and that they would physically not be able to store a chicken in their freezer.

Therefore, respondents thought that consumers should still be able to choose a fresh chicken, however they believed that demand would be low.

“I think as well if you did buy a frozen chicken it would probably take a good day to defrost and people are more sort of busy with their lives and maybe planning their meal or just buying what they want to eat that day.”

(Aberdeen, Female)

Respondents were concerned about the impact that earlier slaughter and restricting thinning might have on consumer choice. Consumers would need to buy two small birds if they were feeding more than one or two people, at a family meal for example. This was felt to be inconvenient and impractical as some people may not have sufficient room to cook two birds in their ovens, they would need the additional space in refrigerators and there may also be a lot of wastage.

“This was the one where there’s less choice because we couldn’t have the bigger birds, so... we didn’t think the consumers would like it, because that would lead to less choice. And obviously the supermarkets wouldn’t really like that either, would they?” (York, Female)

Furthermore, having smaller birds was largely considered to be impractical for both retailers who would require additional space to store more smaller chickens and there would be increased demands on packaging.

4.2 Consumer concerns about associated food safety issues

Respondents also expressed concerns about the effect of different interventions on food safety and consumer confidence when purchasing chicken. The public may be concerned about food safety issues relating to the use of chemicals, additives and ‘processed foods’. However, these concerns may be exacerbated by terms used to describe the interventions. In addition respondents discussed how interventions would impact chicken imported to the UK and concerns about handling frozen chicken safely.

4.2.1 Terminology

Respondents expressed concerns about interventions that used chemicals and additives to reduce the prevalence of *Campylobacter* and said that they preferred food that was 'natural'. Consequently, there was a preference for lactic acid spray, which was perceived to be 'natural', over chlorine washes, which was thought to be a chemical process. However, it was often the case that respondents concerns related to the terminology used, which was considered 'off-putting'. The four interventions perceived to be most affected by negative associations with terms used were: irradiation; chlorine washes; chemical treatments; and steam and heat treatments.

The term 'irradiation' may concern the public because of associations with cancer treatment and radiation poisoning. Whilst respondents generally came to dispel these connotations over time, they believed that the general public would be apprehensive about eating produce that had been irradiated. Therefore, respondents suggested that the term 'cold pasteurisation' may be preferable to 'irradiation'.

"There are negative connotations you get with irradiation and as well all these kind of things, I've never heard anything positive about irradiation and that's why it's really hard to change that kind of opinion... perhaps changing the word, perhaps that might change peoples perceptions of it." (Glasgow, Male)

The terms 'chemical treatment' and 'chlorine wash' evoked negative emotions as they indicated that the process was unnatural and that chemicals would be present on the chicken. Respondents suggested that 'chlorine wash' could be renamed to simply 'washed' or 'hygienically washed'. Respondents also preferred the term 'lactic acid' than 'chemical treatment' and suggested that 'lactic acid sprayed' would be a more 'friendly' term to describe this process.

"Thinking of a chicken being chemically treated, I don't like that."
(Aberdeen, Female)

Respondents also expressed concerns about steam and heat treatments. The term 'heat' especially was thought to imply that the chicken had either been partly cooked, or it would be 'shrivelled'. Removing the term 'heat' and describing the process as 'steaming' was felt to be more appropriate.

It was thought that a public awareness campaign was needed to introduce the interventions and address consumer concerns. This was to dispel any myths around the process, explain why the intervention had been introduced and to highlight the effectiveness of the interventions in reducing levels of Campylobacter.

“We think we need to educate the people to understand what exactly it is and what it does and also to tell them there won’t be any difference in the taste or the look of the bird once... it’s had a chlorine wash. (York, Female)

4.2.2 Interventions and imports

Concern was expressed over the extent to which imported chicken, particularly from outside the EU, would be subject to the same interventions as chicken that had been produced within the UK. Respondents were worried that interventions would not be adhered to abroad in the same way that they are in the UK and that chicken with high levels of Campylobacter would enter the UK food chain.

Respondents were also concerned that consumers may choose to buy imported chicken at a lower cost. It was widely assumed that additional interventions to reduce Campylobacter would cost money and that a proportion of this cost would be passed on to consumers. As a result, chicken from the UK would become more expensive than foreign imports. As some consumers would be more concerned with price than quality or safety, they may choose to buy imported chicken and that this would damage the UK meat and farming industry.

4.2.3 Handling frozen chicken safely

There were a number of key factors about frozen chicken that consumers were uncertain about. These were: how to know when a frozen chicken is fully defrosted; how cooking times need to be adjusted for defrosted chicken; and whether it is possible to refreeze chicken at any point.

Respondents were concerned that consumers were not sufficiently educated in how to safely freeze and de-frost chicken and therefore they were wary of frozen chicken. Respondents commonly mentioned the need to make the public aware of basic food

hygiene practices, particularly around the 'do's and don'ts' of handling frozen chicken.

Respondents stated that they seldom bought frozen chicken and were not used to preparing chicken bought in this way. As such, they were not confident about how long it would take to fully defrost a chicken, whether it was best to defrost chicken in the fridge or on a sideboard, and how long a frozen chicken can be left to thaw before it is unsafe to return it to the freezer. Therefore consumers may be 'nervous' about cooking chicken from frozen.

"I'd be more nervous about the defrosting time, making sure it's fully defrosted" (Belfast, Male)

4.3 Cost versus benefit

Cost was considered to be one of the principle factors which shaped purchase decisions for consumers. Therefore, a key concern for respondents was the effect that each of the interventions would have on the price of chicken. Respondents recognised that all interventions would increase the cost of producing chicken, because they would demand more time and manpower, more energy or expensive packaging materials. There were also indirect costs associated with restricted thinning and earlier slaughter which would require consumers, particularly large families, to buy more than one chicken. Although these interventions would help to reduce the risk of contracting *Campylobacter*, keeping the price of chicken low may be prioritised over the food safety implications as people are accustomed to cheaper chicken.

"Consumers nowadays are driven by price, sometimes that supersedes any kind of health risks in certain situations because it's all they can afford" (York, female)

To ensure chicken remained affordable, it would be preferable if costs associated with these interventions were borne by large retailers and manufacturers. However, respondents thought it was likely these would be passed on to consumers. As fresh chickens carry their brands, respondents believed that supermarkets and manufacturers should be prepared to cover these costs because improving food safety would have a positive effect on their reputation. In contrast, respondents

believed that farmers should not be required to take on additional costs as there was a view that these smaller organisations were already pressured financially. Where interventions would affect the practices of farmers, there was a view that the Government, manufacturers and retailers should underwrite these costs to support small business. However, respondents recognised that it was likely that the cost would ultimately be passed onto the public, either as a consumer or as a taxpayer.

Across groups respondents generally supported the idea that the public would accept a minimal price increase in order to ensure food safety. Respondents suggested that a small price increase, of between 10p and 20p, may not greatly affect consumers and may go unnoticed, particularly as the price of chicken varies due to size differences. In addition, there was support for the view that consumers should take on some of the costs of adopting interventions, particularly as consumers would not be at risk of contracting *Campylobacter* if they handled chicken correctly.

However, the thresholds of what was deemed to be a 'minimal' increase varied between respondents with different incomes, from less than 10p up to £1, indicating that even small cost increases (less than 10p) will not be supported by those on low incomes or those who consider that individual consumers should not be penalised to protect the public in general. There was concern that raising costs too much was likely to discourage people from buying chicken or chicken would become unaffordable for people on lower incomes.

4.3.1 Impact of effectiveness on perception of value

The perceived effectiveness of an intervention in reducing the risk of *Campylobacter* to the public determined whether the likely costs incurred were considered justifiable. However, with the exception of irradiation, respondents believed that none of the interventions would ensure that chicken was consistently free of *Campylobacter*. Therefore, the onus would still be on consumers to ensure that chicken was cooked properly and consequently respondents questioned whether the public would support a noticeable price increase. In particular, respondents questioned the effectiveness of processing interventions which reduced but did not eliminate *Campylobacter* including chlorine washes, lactic acid, steam and heat treatments.

There was a perception that interventions on the farm could prevent *Campylobacter* from contaminating chicken and therefore these interventions had the potential to be

far more effective than treating the birds during processing. However, respondents recognised that these interventions were highly susceptible to human error and once *Campylobacter* was introduced to a flock it would spread quickly to all chickens.

The key benefit of both packaging interventions was in minimising cross contamination with other foods. Although modified atmosphere packaging would reduce *Campylobacter* levels, the chicken would still carry *Campylobacter*. Therefore, the consumer was still at risk of becoming ill if they did not handle the chicken safely.

Statistical information which illustrated how effective the interventions were had little effect on respondents' perception of the interventions which reduced but did not eliminate *Campylobacter*. Although respondents were informed that irradiation would eradicate *Campylobacter* entirely, support for the intervention was limited due to the high costs involved and concerns about the public's response to the term 'irradiation'. Respondent expressed a preference for interventions which would not increase the cost of chicken. In addition to the financial costs, respondents also considered whether the effect on the product would be acceptable, for example changes to taste or appearance, convenience or additives used.

"I would put it [lactic acid spray] as high priority because it seems cheap and easy to do and quite effective and doesn't put anyone off because [...] [we're] already eating it" (London, female)

As cooking chicken thoroughly was sufficient to eradicate *Campylobacter*, respondents questioned whether any of the interventions were necessary and whether the costs were justifiable. Therefore there was a view that interventions were not necessary to protect public health and the public would reject the additional costs.

"it's not altogether needed, it's just a nice idea, that is the way I look at it [...] I just want a quality product at the right price. Now if getting that includes all the precautions that are being taken, great, but if it is a desirable thing that people are going to have to pay more for, I don't think you are going to get the people to pay it." (Cardiff, Male)

Respondents also questioned whether it was fair that the cost of chicken should rise for all consumers in order to protect those who did not cook chicken properly. Respondents tended to believe that they knew how to cook and handle chicken safely. Therefore, they were reluctant to take on additional costs, designed to reduce the prevalence of *Campylobacter*, if they perceive themselves to be able to eliminate risk.

4.4 Wider issues / concerns

Respondents were conscious that there may be wider ethical issues related to these interventions, such as the impact on at risk groups, environmental issues and the burden placed on farmers. However, the impact of these concerns on respondents' decision to support or reject an intervention was limited. Respondents tended to prioritise protecting public health, ensuring that chicken was affordable and maintaining quality over the impact on the environment and farmers. However, this view was not shared by all respondents who said their purchase decisions were shaped by ethical concerns, such as supporting local farmers and buying organic food.

4.4.1 At risk groups

Where interventions were likely to increase the cost of chicken, respondents were concerned about the effect on low income households and large families. Respondents were concerned that chickens that had been processed in a way that reduced *Campylobacter* levels would be more expensive and it was unlikely that interventions designed to reduce *Campylobacter* would be standardised across all fresh chicken. Therefore, they were concerned that low income households would be forced to purchase chickens which were more likely to carry *Campylobacter*.

Respondents recognised that defrosting chicken safely may be more problematic for vulnerable groups, particularly elderly people or people with learning difficulties. However, as these interventions would reduce the prevalence of *Campylobacter*, overall respondents felt that adopting interventions would be beneficial to people who were less able to handle chicken hygienically.

4.4.2 Animal welfare and environmental impact

Respondents recognised that that environmental impact of interventions may be of concern to the public. Respondents were concerned that chemicals, such as

disinfectants and chlorine, used in farms and processing plants may be damaging to the environment, particularly if they were not disposed of carefully. There was a perception that some interventions required high levels of energy to process and store chickens, such as steam and heat treatment, irradiation and freezing. This may also raise concerns about the environmental impact. Finally respondents discussed animal welfare issues associated with interventions on the farm. In order to maintain bio-security, it was necessary that chickens were reared in broiler sheds rather than free-range, which was considered unnatural.

In addition, there was a concern that the public will be discouraged from buying free-range chicken if they were made aware that it was only possible to prevent *Campylobacter* contaminating chickens in broiler sheds. Respondents who bought organic chicken because they believed it was healthier, rather than being motivated by ethical concerns, said that they stopped buying free-range chickens because they believed it was more likely to be contaminated.

4.4.3 Increasing the burden on farmers

Respondents also believed that the financial burden placed on farmers should be considered. Restricting the thinning process or requiring farmers to slaughter birds earlier was thought to impact farmers more severely than improving bio-security measures. Respondents held this view because these interventions were more likely to affect consumer demand as only one size of bird would be available. Therefore respondent felt that increasing bio-security would be more acceptable to farmers and respondents expressed a degree of trust that farmers would want to maintain these standards in order to protect their reputation.

4.5 Effect on consumer confidence

Consumers trust that adequate legislation is in place to ensure that the food they buy is safe to eat. Consequently, there was a view that consumers would expect that interventions were in place to protect them against *Campylobacter*. Respondents therefore felt that interventions which did not affect the quality or appearance of the chicken, such as bio-security measures and leak-proof packaging should be adopted.

Raising awareness about these interventions may have a positive effect on consumer confidence in food safety practices during the processing of chicken.

“The consumer point of view we thought it was reassuring to know that these practices were there, we would hope that they were there anyway.” (Aberdeen, Female)

In order to establish consumer confidence in new interventions it may be necessary to address consumer concerns about food safety and the impact on taste and quality. Respondents were concerned that where interventions affected price or appearance of the chicken, there may be a need for education to inform the public about the benefits of the intervention and to address any concerns they may have.

As consumer confidence in food safety increases, there may be a danger that they would become complacent to food hygiene standards in their own home. Respondents suggested that in *trusting* the government and the FSA to ensure food safety standards are maintained, consumers deferred their own sense of responsibility.

Consequently, respondents were cautious about raising awareness about measures to reduce *Campylobacter* levels as the consumer may then believe it is the responsibility of Government and industry to eradicate *Campylobacter*.

5. Summary of views about interventions

Farming interventions	Affect on experience	Food safety	Wider issues	Cost versus Benefit
Bio-security	<ul style="list-style-type: none"> No effect on quality of the meat 	<ul style="list-style-type: none"> As the meat has not been processed consumers would not be conscious of food safety concerns Bio-security measures are still at easy risk of being compromised by human error 	<ul style="list-style-type: none"> Bio-security likely to have least impact on farmers' businesses Minor concern about bio-security chemicals entering into food chain/land Animal welfare issues as birds must be reared in broiler sheds 	<ul style="list-style-type: none"> Perception that the impact on cost to the public would be minor Would only be effective where measures were strictly maintained which may not always be possible
Restricting thinning	<ul style="list-style-type: none"> Reduced choice of bird size Can be inconvenient and more expensive for larger families, couples and those living alone 	<ul style="list-style-type: none"> As the meat has not been processed consumers would not be conscious of food safety concerns 	<ul style="list-style-type: none"> Affordability issues as larger families would need to buy two birds 	<ul style="list-style-type: none"> Restricting the thinning process was considered to be vital to maintaining bio-security However, this was not considered to justify additional cost to farmers and the impact on choice of bird size
Earlier slaughter	<ul style="list-style-type: none"> Reduced choice of bird size Can be inconvenient and more expensive for larger families, couples and those living alone Chicken may taste different – likened to difference between beef and veal 	<ul style="list-style-type: none"> As the meat has not been processed consumers would not be conscious of food safety concerns 	<ul style="list-style-type: none"> Affordability issues as larger families would need to buy two birds Would require more packaging as more birds would be produced Animal welfare issues – people may object to chickens being slaughtered early 	<ul style="list-style-type: none"> Although this intervention reduced the incidence of Campylobacter this was not considered to justify the impact on choice of bird size

Processing interventions	Affect on experience	Food safety	Wider issues	Cost versus Benefit
Freezing	<ul style="list-style-type: none"> Likely to require a 'cultural change' in consumers to switch from buying fresh/chilled chicken to buying frozen Inconvenient due to preparation time therefore demand likely to be low 	<ul style="list-style-type: none"> Confusion exists over correct and safe ways to handle frozen chicken 	<ul style="list-style-type: none"> Additional energy required to process and store chicken 	<ul style="list-style-type: none"> Frozen chicken perceived as 'cheap' Considered to be effective because it reduces levels of Campylobacter and prevents cross-contamination However, did not justify impact on convenience
Irradiation	<ul style="list-style-type: none"> Concerns about the impact on appearance, taste and smell 	<ul style="list-style-type: none"> Public is likely to have strong concerns about the safety of this process. Particularly as the process is more difficult to understand that chemical washes. Term 'irradiation' has negative connotations 	<ul style="list-style-type: none"> Affordability – likely to have the greatest impact on cost. Environmental impact was considered, however food safety and affordability issues were a greater concern 	<ul style="list-style-type: none"> 100% effective which was valued. However, likely to have the greatest impact on cost. Likely to be limited demand as consumers would be concerned about safety
Chlorine washes	<ul style="list-style-type: none"> Concerned about effect on smell and taste Terms 'chlorine' associated with swimming pools 	<ul style="list-style-type: none"> Term 'chlorine' associated with bleaching Concern as intervention is currently banned within the EU Knowledge that chlorine is used in tap water and in products such as bagged salad was reassuring 	<ul style="list-style-type: none"> Concern about use of chemicals in processing 	<ul style="list-style-type: none"> Financial costs likely to be low in comparison to freezing Reduces Campylobacter but not 100% effective, therefore it would still be necessary for consumers to cook thoroughly
Lactic acid spray	<ul style="list-style-type: none"> Concerned about effect on smell and taste Sounds natural which mitigates this concern 	<ul style="list-style-type: none"> Public may be less concerned by lactic acid spray than chlorine wash as it was considered 'natural' and it was already used in yoghurts 	<ul style="list-style-type: none"> Concern about use of chemicals in processing Although, lactic acid was considered to be 'natural' therefore this concern was mitigated 	<ul style="list-style-type: none"> Financial costs likely to be low in comparison to freezing Reduces Campylobacter but not 100% effective, therefore it would still be necessary for consumers to cook thoroughly
Steam and heat treatment	<ul style="list-style-type: none"> Concern raised that this intervention would alter the appearance of chicken 	<ul style="list-style-type: none"> Favoured the use of natural water methods to reduce Campylobacter in chicken However, expressed concern that chicken would be partially cooked 	<ul style="list-style-type: none"> Environmental impact was considered, however food safety and affordability issues were a greater concern 	<ul style="list-style-type: none"> Concern about impact on cost Reduces Campylobacter but not 100% effective, therefore it would still be necessary for consumers to cook thoroughly

Packaging interventions	Affect on experience	Food safety	Wider issues	Cost versus Benefit
Leak-proof packaging	<ul style="list-style-type: none"> As meat is not processed packaging interventions would have little effect on quality of meat. 	<ul style="list-style-type: none"> No concerns about safety issues resulting from the packaging Would prevent cross-contamination in supermarkets 	<ul style="list-style-type: none"> Questions raised over whether leak proof packaging will be biodegradable or friendly to the environment 	<ul style="list-style-type: none"> Packaging interventions seem relatively cheap to produce and install, but does still not prevent the spread of Campylobacter once chicken is out of packaging – threat of cross-contamination in the kitchen still evident
Modified atmosphere packaging	<ul style="list-style-type: none"> As meat is not processed packaging interventions would have little effect on quality of meat. 	<ul style="list-style-type: none"> As modified atmosphere packaging is used for bagged salads, concerns about safety were mitigated Would prevent cross-contamination in supermarkets 	<ul style="list-style-type: none"> Questions raised over whether modified atmosphere packaging would be biodegradable or friendly to the environment 	<ul style="list-style-type: none"> Packaging interventions seem relatively cheap to produce and install, but does still not prevent the spread of Campylobacter once chicken is out of packaging – threat of cross-contamination in the kitchen still evident

6. Conclusions

Respondents recognised that *Campylobacter* presented a significant public health risk and therefore they supported interventions designed to reduce the incidence of the bacteria in chicken sold to the public. However, it was considered unlikely that any package of interventions would eliminate *Campylobacter* altogether. Therefore, respondents thought that a package of interventions should be adopted alongside a Government sponsored awareness campaign which emphasised that consumer's had a responsibility to handle chicken hygienically and identified practical measures to protect themselves, particularly to judge that chicken is cooked and to avoid cross-contamination.

There were several factors which influenced respondents' attitudes to each of the interventions. It would be important to consider these when introducing any of the interventions, particularly in considering how the public is made aware of any changes to processing of chickens.

Effect on consumer experience: Any interventions which changed the taste, smell or appearance of chicken were likely to discourage consumers from purchasing those products, particularly as judgements about the quality and freshness of meat products were often based initially on appearance and smell. Although it was considered unlikely that retailers would produce food which was, or appeared to be, unpleasant, consumers may still be put off by terms which would suggest an effect on taste or quality particularly 'chlorine wash' and 'chemical treatments'.

There was also a concern that introducing earlier slaughter, restricted thinning or freezing would mean that buying and cooking chicken would be less convenient. Therefore, consumers should be able to choose chickens which have not been treated in this way. However respondents believed that consumer demand for frozen chickens or smaller birds may be low.

Food safety: As with concerns about the taste or quality of the meat, terminology used to describe the interventions would have a critical effect on consumers' perception about whether the chicken was safe to eat.

Cost versus benefit: Respondents were reluctant to take on additional costs because the interventions discussed only reduced the levels of *Campylobacter* rather than eliminating the risk to consumers. Therefore, consumers would still have a responsibility to cook chicken thoroughly. Consumers may accept a small price increase on the condition that chicken remained affordable. This could be achieved by sharing costs with retailers and the Government.

Wider Issues: Respondents recognised that some interventions may give rise to wider ethical concerns. There may be implications for at risk groups, particularly low income households, the elderly and people with learning difficulties. In addition, the impact on the environment and animal welfare may be a concern for some consumers. However, it was likely that the public on the whole would prioritise benefits to public health over concerns about the environment or animal welfare.

Preference for a package of interventions

Launching a package of interventions would be reassuring to consumers, if their concerns about these issues were addressed. However, it would be important to promote hygienic handling of chicken to ensure that the public do not become complacent about their responsibility to protect themselves.

Farming: Effective interventions on the farm were considered preferable as preventing *Campylobacter* from contaminating chicken on the farm would mean that later processing interventions would be unnecessary. However respondents were not confident that it would be possible to prevent *Campylobacter* from entering broiler sheds, particularly if thinning practices continued. Therefore, respondents would support maintaining and standardising bio-security measures but would reject additional measures which would increase the pressure on farmers.

Processing: Lactic acid spray and steam and heat treatment received the greatest support as these interventions were considered more natural than irradiation and chlorine wash. It is likely that consumers would be less resistant to terms which were 'natural sounding' such as 'hygienically washed' or 'lactic acid spray' rather than 'chemical treatment'. Although freezing was considered familiar and effective, due to concerns about the impact on convenience and quality respondents felt that demand would be low.

Packaging: These interventions received the greatest support from respondents as there was a perception that it would be more difficult for consumers to protect themselves against cross-contamination than it was to determine where chicken was cooked thoroughly. In addition these interventions were thought to have a minimal effect on cost and the quality of the meat.

The effect that each of the interventions had on convenience, cost and public concerns about 'processed foods' – particularly chemical treatments and irradiation – may be prioritised over their effectiveness in reducing levels of Campylobacter. Therefore, only the interventions which were considered to be inexpensive and which would have a minimal effect on the product received the strongest support across groups, particularly standardising bio-security measures across farms and changes to the packaging. Whilst respondents recognised the value of processing interventions in reducing Campylobacter levels, it would be important to consider how products are labelled and the terminology used to describe these interventions in order to ensure they do not discourage consumers from buying the products.