



**CONSUMER KNOWLEDGE, ATTITUDES  
AND BELIEFS WITH RESPECT TO *CAMPYLOBACTER*,  
CAMPYLOBACTERIOSIS AND POULTRY**

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August 2008

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## SUMMARY

### Aim

Campylobacteriosis is a major public health problem in New Zealand. Based on notification rates, the reported incidence of the illness is high compared to other developed countries. One of the recognised transmission routes for the disease has been the handling/consumption of poultry meat. The current consumer survey arose from ongoing research commissioned by the NZFSA. The aim was to gather information on consumer knowledge, attitudes and beliefs with respect to *Campylobacter*, campylobacteriosis and poultry from a sample of 1000 consumers nationally across New Zealand.

### Methods

The questionnaire was developed by ESR, with input from NZFSA and UMR Research Ltd. (a professional telephone survey company). The questionnaire was converted by UMR into computer-assisted telephone interviewing (or CATI) format. The national survey was conducted from 23<sup>rd</sup> February 2008 to the 14<sup>th</sup> May 2008 from the researcher's national interview facility in Auckland.

The required sample of 1000 completed interviews was evenly distributed over a 12 week period, with approximately 330 completed interviews performed every 4 weeks. Private households were randomly selected using random digit dialing generated from the Telecom White Pages for New Zealand. Participants recruited were 18 years or older and bought food for the household and prepared or handled food including meat.

### Results

In total, 13,650 telephone numbers were called. Total eligible households called were 11,748 in order to complete 1000 interviews. The over-all cooperation rate was 19.1%. There was a higher proportion of female respondents than male (69.2% vs 30.8%). A demographic comparison table has been constructed for the 1000 interviewees and the population as a whole, to evaluate how representative the sample was of the national population. Summary tables contain the results of the survey. As the survey was predominantly a CATI technique, there were few free text answers in the results. For this reason, the data did not require cleaning.

Key findings of the survey include:

- From a selected list of foods, 89% of respondents thought chicken was likely to cause food poisoning, followed by other meats (21-58% of respondents, depending on the meat type), milk and dairy products (25% of respondents) and fresh fruit and vegetables (4% of respondents).
- Consumers receive information on chicken-related food safety issues from a range of media sources, including television>newspaper>journals/magazines>radio.
- Consumers appear to be eating chicken more frequently than 10 years ago, with the main reasons being taste, convenience, healthiness and value for money.
- Boneless portions are the most commonly purchased form of chicken, with fresh/raw being the most commonly purchased state.

- There appears to have been an increase in the practice of thawing chicken in the refrigerator since 2005.
- Most current chicken purchasers (84%) would buy chicken if only frozen chicken was available. Loss of convenience was seen as the major disadvantage of freezing.
- Stricter farm management practices were seen as the most acceptable means of controlling bacteria on chicken, with chemical treatment the least acceptable. From the 988 respondents who consume chicken, approximately one-quarter would be prepared to pay a 10-20% premium for safer chicken achieved through stricter farm management practices.

## 1 INTRODUCTION

Campylobacteriosis is a major public health problem in New Zealand. Based on notification rates, the reported incidence of the illness is high compared to other developed countries. One of the recognised transmission routes for the disease has been the handling/consumption of poultry meat.

While a number of poultry risk management strategies have been implemented or are being considered, there are ongoing calls for the removal of fresh product from sale unless it can be demonstrated to have achieved a 'standard' of protection from *Campylobacter* contamination. If fresh poultry becomes unavailable, consumers would either have to purchase frozen poultry or another nutritional source to substitute for this food. This may have implications for consumers' nutritional and health status. The attitude of consumers, their knowledge and beliefs with respect to poultry in New Zealand are not known, nor how acceptable such changes would be. Neither has the effectiveness of the risk communication messages with respect to campylobacteriosis and poultry been assessed.

The current survey was initiated to support the NZFSA's *Campylobacter in Poultry Risk Management Strategy 2006-2009*. The aim was to gather information on the opinions and practices from a nationally representative sample of 1000 domestic consumers across New Zealand.

## **2 METHODOLOGY**

### **2.1 Study Methods**

#### **2.1.1 Study design**

Survey methodology choices are influenced by a number of factors, including nature of the questions, response rates, resources, time, and population of interest (Statistics New Zealand, 1995). Community questionnaire surveys delivered through telephone interviews provide the means to obtain a representative national sample at reasonable cost. Self administered mail surveys may be cheaper, and possibly reach a larger proportion of the population through the postal system sampling frame, but also require greater time and data entry following survey response. Face to face interviews may provide a higher response rate, but require more resources. The sampling frame for email or internet based surveys (those with computer and internet access) is likely to be highly biased.

The sampling frame for landline telephone interviews has the potential to introduce bias. Geographically mobile people, those in rented accommodation, and lower socio-economic groups are likely to be under-represented in telephone surveys (de Vaus, 1985). The collection of demographic data (as in this survey) permits adjustment for some of these factors, if required.

It is acknowledged that there are discrepancies between self reported behaviours in relation to food hygiene and actual practices (over-reporting of "good" behaviours) (Redmond and Griffith, 2003). It is less likely that this would be a factor in this survey, which only examines consumer knowledge, preferences and purchasing behaviours.

Due to the anonymous nature of the study, it was considered that ethics approval was unnecessary.

#### **2.1.2 Study period**

The questionnaire was developed and presented to the Risk Communications Group at NZFSA for comment in November 2007. The questionnaire was then sent to UMR Research in January 2008. UMR suggested several amendments until the questionnaire was finally ready for piloting in early February 2008. The questionnaire was converted in the CATI system and following the pilot and training of the twenty interviewers, the main survey got underway and was conducted in three phases as follows:

- 23<sup>rd</sup> February 2008 to 11<sup>th</sup> March 2008
- 15<sup>th</sup> March 2008 to 15<sup>th</sup> April 2008
- 19<sup>th</sup> April 2008 to 14<sup>th</sup> May 2008

#### **2.1.3 Sample size**

A sample size of 1000 completed interviews was sought. A final summary of the 1000 interviews was sent to ESR by UMR on the 16<sup>th</sup> June 2008 together with an Excel spreadsheet containing the details of the 1000 interview responses.

#### 2.1.4 Source and eligible population

The source population was the entire New Zealand population. The eligible population included all persons in private households with a land telephone line (both listed and unlisted). The NZ Census 2006 estimate of access to landline is 91.6% of the population.

#### 2.1.5 Sampling frame

The use of random digit dialling (RDD) meant that the sampling frame was based on telephone numbers that had been randomly generated from all number ranges in Telecom's White Pages of New Zealand. Telecom is New Zealand's national telephone directory provider. This allowed for the capture of unlisted numbers. The following types of telephone numbers were filtered out from the randomly generated numbers: the Telecom yellow pages (business listings); fax lines; and disconnected numbers.

#### 2.1.6 Sample selection

The total study sample was composed of a general population sample. No specific stratification or oversampling of sub-populations was included.

### **2.2 General Sample Protocol**

#### 2.2.1 Recruitment

The general sample involved the recruitment of 333 study participants per 4 week period. In the third and last period, 334 study participants were recruited.

#### 2.2.2 Household selection

Random digit dialling was conducted to select private households using randomly generated telephone numbers as previously described. If the interviewer determined that the contact was a business line or the contact was not a private household, the interviewer did not proceed with the survey.

#### 2.2.3 Participant selection

The interviewer introduced the survey then explained that they would like to select one person in the household who was over 18 years of age, who bought food and prepared food including meat. The selected person was then asked if they were happy to take part in the survey and whether they were vegetarian. Because the survey was focused on meat purchase decisions, meat handling and meat consumption, interviews with vegetarians were terminated at this point.

### **2.3 Survey Instrument**

#### 2.3.1 Scope and design

The scope of survey questionnaire was agreed through discussions between NZFSA and ESR. Design was carried out by ESR, with input from NZFSA and UMR.

### 2.3.2 Pilot

The draft questionnaire was tested on ten general public households on the evening of 15<sup>th</sup> February 2008. As a result, minor changes in style and order of questions were made. Data from the pilot interviews were not included in the overall dataset used for the study analysis.

## 2.4 **Data Collection**

### 2.4.1 Interview scheduling

Interviews were routinely conducted at the following times and days of the week;

- 5:30 pm – 9:00 pm during the week
- 9:30 am – 6:00 pm on Saturday
- 9:30 am – 9:00 pm on Sunday

No interviews took place at the Easter public holidays. English language only was used. Appointments were made to call back study participants if the time they were first contacted was not convenient. Up to five call-backs were made for engaged numbers, unanswered numbers, answering machines and unavailable participants.

### 2.4.2 Interview respondents

Study participants aged 18 or older were directly interviewed after providing consent and confirming that they were not vegetarian.

### 2.4.3 Interview

Interviews were conducted using computer assisted telephone interviewing (CATI). All questions were administered in a full interview, the duration of which ranged from 10 to 15 minutes. The results for certain questions are presented in descending order, however during the interview itself, the list of possible answers was read or presented in a random order.

### 2.4.4 Briefings

All interviewers were given an initial briefing presentation to provide the context for the CATI.

### **3 SURVEY CHARACTERISTICS**

#### **3.1 The Survey**

##### **3.1.1 Quality control**

Quality assurance processes between February and May 2008 were carried out by UMR and their report is included in Appendix 2. Twenty interviewers were briefed and trained for this CATI survey. The project ran smoothly over the three months of interviewing with a stable interviewing team.

All interviewers had a sample of their interviews validated as part of the quality assurance process. A minimum of 10% of each interviewer's work is validated.

##### **3.1.2 Reliability**

Concordance testing of the observed interviews and their documentation was performed during the validation and quality control checks. In total, 270 of the 1000 interviews were validated, either through direct observation of the interviewer or through a re-interview where key or eligibility questions are asked a second time.

##### **3.1.3 Cooperation rate**

The overall cooperation rate was 19.1%. This figure is calculated as the number of completed interviews divided by the sum of the completed interviews, refusals, hang ups, language problems and stopped interviews (i.e.  $1000/5239 = 19.1\%$ ).

The cooperation rate obtained in this survey were "typical of those for a non-incentivised telephone survey by market research companies in New Zealand" (personal communication with UMR Market Research).

In total, 13,650 telephone numbers were called. Of those, 302 were business or fax numbers and 1,600 were disconnected. Therefore total eligible households called were 11,748. Table 1 shows the details of the telephone interactions for the general sample.

**Table 1: Number of telephone interactions for the general sample**

Telephone Interaction	Number
No answer	1 343
Busy	138
Language problems	141
Hung up	247
Refusals	3 847
Not suitable/ did not meet sampling criteria	3 657
Terminated/ abandoned	33
Appointments not kept	142
Stopped interviews	4
Answer machine	1 137
Physically unable/mentally unable	14
Hearing problems	45
Completed interviews	1 000
<b>Total</b>	<b>11 748</b>

### 3.2 Sample Characteristics and Distribution

Table 2 gives a comparison between the demographic characteristics of the survey cohort and the general New Zealand population.

**Table 2: Characteristics of survey households compared with Census 2006 households (unless otherwise stated)**

Respondent characteristic	General Sample (n=1000)		Census 2006	
	N	%	N	%
<i>Sex</i>				
Male	308	30.8	2,062,329	48.8
Female	692	69.2	1,965,618	51.2
<i>Age Group</i>				
18-19	14	1.4	114,099	3.8
20-24	28	2.8	270,975	9.1
25-29	82	8.2	242,439	8.2
30-34	98	9.8	276,561	9.3
35-39	145	14.5	301,551	10.1
40-44	125	12.5	313,701	10.5
45-49	115	11.5	293,424	9.9
50-54	78	7.8	252,729	8.5
55-59	71	7.1	233,568	7.9
60-64	77	7.7	179,613	6.0
65-69	50	5.0	148,548	5.0
70-74	60	6.0	116,937	3.9
75+	57	5.7	230,127	7.7
<i>Indigenous status*</i>				
Māori	82	8.2	565,326	12.8
Non-Māori	918	91.8	3,863,520	87.2
<i>Region<sup>#</sup></i>				
Northland	34	3.4		3.6

Respondent characteristic	General Sample (n=1000)		Census 2006	
	N	%	N	%
Greater Auckland	312	31.2		32.1
Waikato/Thames	91	9.1		9.3
Bay of Plenty	70	7.0		6.2
Gisborne	14	1.4		1.0
Hawkes Bay	37	3.7		3.6
Taranaki	27	2.7		2.6
Manawatu-Wanganui	58	5.8		5.5
Wellington-Wairarapa	135	13.5		11.3
Nelson	19	1.9		1.1
Marlborough	8	0.8		1.1
West Coast/Buller	6	0.6		0.8
Canterbury	130	13.0		13.4
Otago	42	4.2		5.1
Southland	17	1.7		2.3
<b>Household size**</b>				
1	153	15.3	281,049	22
2	333	33.3	433,389	34
3	168	16.8	213,438	16.7
4	199	19.9	194,811	15.3
5 or more	127	12.7	153,036	12
Refused	11	1.1	-	-
Unsure	9	0.9	-	-
<b>Personal income***</b>				
\$15,000 or less	156	15.6	803,865	25.4
\$15,001-25,000	145	14.5	479,739	15.2
\$25,001-30,000	97	9.7	215,301	6.8
\$30,001-40,000	118	11.8	404,070	12.8
\$40,001-50,000	97	9.7	262,299	8.3
\$50,001-70,000	125	12.5	281,157	8.9
More than \$70,000	97	9.7	230,643	7.3
Refused	122	12.2	320,892	10.2
Income was nil/or made a loss	43	4.3	162,405	5.1

\*20 years or more

\*\* For household size, NZ Census 2001 data was used as figures from the NZ 2006 Census were not available.

\*\*\* Personal income bands for 15 years and older

# Regional percentage data for the population supplied by UMR Research Ltd.

Comparative gender, age and indigenous status are derived from Census 2006 data for the estimated resident population of 18 year olds and older.

The estimated resident population of New Zealand is an estimate of all people who were usually living in New Zealand at June 2006. Visitors from overseas are excluded. It is based on the census usually resident population count with adjustments for residents missed or counted more than once by the census (net census undercount), and for residents temporarily overseas on census night <http://www.stats.govt.nz/tables/nat-pop-est-tables.htm>.

The selection protocols for the survey have the potential to skew the sample, compared to the general population, as the survey sought to interview household members actively involved in food purchasing and preparation. As would be expected, this was observed in the gender ratio, with females being over-represented. The under-25 age group was under-represented while the 30-49 age group, the 60-64 and 70-74 age group were over-represented. Regional representation was extremely well matched with regional population data supplied by UMR. Single-person households were under-represented while four-person households were over-represented. Māori were under-represented.

### **3.3 Margin of Error**

The margin of error for a 50% figure at the '95% confidence level' is  $\pm 3.1\%$ . As mentioned earlier, although results are presented in descending order in the following tables, potential answers or choices were offered in random order.

## 4 SURVEY RESULTS

### 4.1 Role of Respondents in Household

Tables 3 and 4 summarise the role of the survey respondents in the purchasing and preparation of food for the household.

**Table 3: Respondent role in household food purchasing**

<b>MAIN PURCHASER OF HOUSEHOLD FOOD</b>	
<i>Are you the person who most often buys food for the household?</i>	
	<b>2008 (n=1,000) %</b>
Yes	86
No	11
Other	3
Unsure	-
Base: All respondents	

**Table 4: Respondent role in household food preparation**

<b>MAIN PREPARER OF HOUSEHOLD FOOD</b>	
<i>Are you the person in the household who most often prepares food for the household?</i>	
	<b>2008 (n=1,000) %</b>
Yes	84
No	12
Other	4
Unsure	-
Base: All respondents	

In over 80% of interviews, the respondent was the main purchaser and/or preparer of food for the household. This establishes that the answers to subsequent questions are likely to be representative of actual practices in the particular household.

## 4.2 Knowledge and Beliefs on Food Safety Issues

The next set of tables (Table 5 to 9) relate to the respondents' beliefs and knowledge of foods likely to cause food poisoning.

Table 5 summarises the results from a question to test respondents' knowledge and beliefs concerning the likelihood of a selection of foods causing food poisoning.

**Table 5: Respondents' belief of foods likely to cause food poisoning**

<b>FOODS THAT MAY CAUSE FOOD POISONING (SUMMARY TABLE)</b>	
<i>Food poisoning symptoms can include vomiting, diarrhoea, stomach pains and so on. We can encounter food poisoning bugs from many different foods. How likely is it that the following foods may cause food poisoning, using a 1 to 5 scale where 1 means very likely and 5 means very unlikely to cause food poisoning.</i>	
	<b>2008 (n=1,000) %*</b>
Chicken	89
Processed meats (e.g. ham, bacon, salami, deli meats)	58
Pork	51
Milk and dairy products	25
Beef	22
Lamb/mutton	21
Fresh fruit and vegetables	4
Base: All respondents	

\* Percentages are based on the proportion of respondents who chose 1 or 2 on a likelihood scale of 1 to 5

Chicken was the food in this selection most commonly identified as a cause of food poisoning. Amongst other meat types there was a clear distinction between pork (51% thought it was likely to cause food poisoning) and beef/lamb (22/21% thought they were likely to cause food poisoning). A more detailed breakdown of response to this question is given in Table 6.

**Table 6: Respondents' belief of foods likely to cause food poisoning - details**

<b>FOODS THAT MAY CAUSE FOOD POISONING</b>								
<i>Food poisoning symptoms can include vomiting, diarrhoea, stomach pains and so on. We can encounter food poisoning bugs from many different foods. How likely is it that the following foods may cause food poisoning, using a 1 to 5 scale where 1 means very likely and 5 means very unlikely to cause food poisoning.</i>								
	<b>1 – Very likely to cause food poisoning %</b>	<b>2 %</b>	<b>TOTAL AGREE 1+2 %</b>	<b>3 %</b>	<b>4 %</b>	<b>5 – Very unlikely to cause food poisoning %</b>	<b>TOTAL DISAGREE 4+5 %</b>	<b>Unsure %</b>
Chicken	71	18	<b>89</b>	<b>6</b>	2	3	<b>5</b>	-
Processed meats (e.g. ham, bacon, salami, deli meats)	28	30	<b>58</b>	<b>21</b>	12	7	<b>19</b>	2
Pork	21	30	<b>51</b>	<b>28</b>	11	6	<b>17</b>	4
Milk and dairy products	8	17	<b>25</b>	<b>32</b>	25	17	<b>42</b>	1
Beef	6	16	<b>22</b>	<b>31</b>	28	17	<b>45</b>	2
Lamb/mutton	6	15	<b>21</b>	<b>34</b>	27	16	<b>43</b>	2
Fresh fruit and vegetables	2	2	<b>4</b>	<b>5</b>	16	75	<b>91</b>	-
Base: All respondents (n=1,000)								

These results are qualitatively similar to recent consumer surveys carried out by NZFSA during August 2003, May 2005 and July 2007 (New Zealand Food Safety Authority, 2003; 2005; 2007). The NZFSA survey asked respondents (n=750) if they had safety concerns about a list of foods. The percentages of respondents reporting concern were:

<b>Food type</b>	<b>August 2003 (%)</b>	<b>May 2005 (%)</b>	<b>July 2007 (%)</b>
Chicken	85	83	85
Deli or cooked meats	71	68	70
Raw meat	70	71	69
Fresh milk	33	35	32
Fresh vegetables	27	25	23
Fresh fruit	28	24	23

In a survey of 252 households in the South West of England participants were asked to name foods that they considered might constitute a food poisoning risk (Evans, 1992). Most of the respondents (73%) considered poultry to be a problem. Meat was mentioned by 66.7%, unfortunately this was not broken down further into species. Dairy products were identified by 22%.

Table 7 summarises responses on the types of food safety issues interviewees would expect to be associated with chicken.

**Table 7: Respondent knowledge of food safety issues associated with chicken**

<b>FOOD SAFETY ISSUES ASSOCIATED WITH CHICKEN</b>			
<i>For each of the following food safety issues, please tell me if you associate chicken with that issue?</i>			
	<b>2008 (n=1,000)</b>		
	<b>Yes %</b>	<b>No %</b>	<b>Unsure %</b>
Food poisoning	94	5	1
Growth hormones	79	15	6
Food additives	45	51	4
Pesticide residues	29	65	6
Heavy metals	10	83	7
Base: All respondents			

The major of respondents identified food poisoning. However, a considerable number identified issues that are largely irrelevant to chicken in New Zealand. Food additives are not used on chicken meat (except those with marinades or toppings), while growth hormones are not used in New Zealand poultry (Poultry Industry Association of New Zealand, 2008). Levels of pesticides and heavy metals are generally very low in New Zealand poultry (Vannoort and Thomson, 2005).

Concern over issues such as food additives and pesticide residues is likely to reflect a public interest in these issues in general, rather than their specific association with chicken. This view is consistent with recent NZFSA consumer surveys conducted in August 2003, May 2005 and July 2007 (New Zealand Food Safety Authority, 2003; 2005; 2007) (n= 750), which asked respondents to express their level of concern about a selected range of general food safety issues. The percentage of respondents reporting concern about selected foods safety issues were:

<b>Food safety issue</b>	<b>August 2003 (%)</b>	<b>May 2005 (%)</b>	<b>July 2007(%)</b>
<i>Salmonella</i>	79	80	77
<i>Campylobacter</i> *	-	-	63
Antibiotics in meat	62	62	67
Pesticide use	61	63	62
Food additives (colours etc)	57	58	61

\*Question not asked in 2003 or 2005.

While it is difficult to make direct comparisons between the NZFSA surveys and the current survey, there is some suggestion that although consumers associate food additives and pesticides with chicken, fewer consumers associate these issues with chicken than with the food supply in general.

High current public interest in food additives and pesticide residues has been noted in overseas studies (Brimer, 2004). A British survey of general food concerns amongst 154 elderly (65+ years) respondents gave a similar ordering of issues, with food poisoning (24%) rated ahead of chemical residues (12%) and food additives (7%) (Johnson *et al.*, 1998).

Table 8 summarises results of a question that examined the knowledge of respondents as to what microbiological hazards are likely to be associated with chicken.

**Table 8: Respondent knowledge of microbiological hazards associated with chicken**

<b>BACTERIA OR VIRUSES ASSOCIATED WITH CHICKEN</b>			
<i>Food poisoning is usually caused by bacteria or viruses. Which of the following bacteria or viruses do you associate with chicken?</i>			
	<b>2008 (n=1,000)</b>		
	<b>Yes %</b>	<b>No %</b>	<b>Unsure %</b>
<i>Salmonella</i>	90	6	4
<i>Campylobacter</i>	70	15	15
<i>E. coli</i> O157	51	27	22
Norovirus	12	57	31
<i>Giardia</i>	12	77	11
Base: All respondents			

It is interesting to note that, despite extensive recent media focus on *Campylobacter* in chicken, New Zealand consumers are more likely to identify *Salmonella* as a chicken-associated hazard. This is consistent with the NZFSA survey carried out in July 2007, where 77% of 750 respondents identified *Salmonella* as a general food safety issue of concern compared with 63% identifying *Campylobacter* (New Zealand Food Safety Authority, 2007). It should be noted that the NZFSA survey asked respondents whether they were concerned about these food safety issues in the whole food supply, not solely in chicken.

This result is also consistent with surveys conducted in Australia, the United Kingdom, Ireland and the USA, which found that the general public were significantly more aware of *Salmonella* than *Campylobacter*. However, it is important to note that these overseas surveys were not asking questions directly in association with chicken. In an Australian telephone survey (Jay *et al.*, 1999), of 1,203 randomly selected households, 96% of respondents had heard of *Salmonella* as a bacteria causing illness, 52% had heard of *E. coli*, and 8% had heard of *Campylobacter*. A similar question was asked in the UK of 252 households (Evans, 1992).

Most householders could name *Salmonella* (78.8%) but few had heard of *Campylobacter* (<1%). In Ireland, face-to-face interviews in 1020 households (Kennedy *et al.*, 2005) found that 92.9% recognised *Salmonella* but only 10.2% had heard of *Campylobacter*. In a telephone survey of 1,620 residents of the USA, 80.2% of respondents had heard of *Salmonella*, with 53.7% able to name an associated food vehicle (Altekruse *et al.*, 1996). In contrast, 4.7% had heard of *C. jejuni* or *coli*, with only 0.4% able to correctly identify a food vehicle.

A small scale survey of 28 United Kingdom consumers asked about perceived food risks in chicken meat in a face-to-face interview format (Yeung and Morris, 2001). The risks mentioned by the consumers were: *Salmonella* (26/28), *E. coli* (18/28, possibly a cross over from publicity about contamination of red meat), GM crops fed to chicken (17/28, although actually banned in the UK), antibiotic residues (12/28), nutritional imbalance (6/28). Risk reducing strategies concerning chicken were most often to do with product quality (e.g. brand loyalty) (24/28), information (e.g. labels) (23/28), or post purchase controls (in the home) (20/28). The price of product was mentioned less frequently (e.g. higher price for premium quality product) (11/28).

In New Zealand, even though fewer people had heard of *Campylobacter* than *Salmonella*, awareness of *Campylobacter* as a foodborne pathogen appears to be much greater than in the other countries mentioned.

Table 9 shows the level of concern regarding the statement that raw chicken may carry pathogenic bacteria.

**Table 9: Level of concern that raw chicken carries bacteria**

<b>LEVEL OF CONCERN THAT RAW CHICKEN CARRIES BACTERIA</b>	
<i>Raw chicken bought by consumers may often carry the bacteria Campylobacter and may occasionally carry the bacteria Salmonella. How concerned are you that raw chicken carries these bacteria, using a scale from 1 to 5 where 1 means very concerned and 5 means not concerned at all?</i>	
	2008 (n=988) %
1 Very concerned	34
2	20
<b>TOTAL CONCERNED (1+2)</b>	<b>54</b>
<b>3</b>	<b>26</b>
4	12
5 Not concerned at all	8
<b>TOTAL NOT CONCERNED (4+5)</b>	<b>20</b>
Unsure	-
Base: Those who consume chicken	

One-third of respondents were very concerned, while just over half of respondents were classified as being concerned.

### 4.3 Information Sources on Food Safety Issues

Tables 10 and 11 relate to where consumers derive their food safety information from.

**Table 10: Media sources of consumer information on food safety issues with chicken**

<b>MEDIA CONTAINING INFORMATION ON FOOD SAFETY ISSUES WITH CHICKEN</b>			
<i>Have you heard or read about food safety issues associated with chicken...?</i>			
	<b>2008 (n=1,000)</b>		
	<b>Yes %</b>	<b>No %</b>	<b>Unsure %</b>
On Television	75	23	2
In the Newspaper	67	32	1
In Journals and magazines	66	33	1
On the Radio	47	52	1
On the Internet	18	81	1
Or somewhere else	45	54	1
Base: All respondents, multiple response			

The information summarised in Table 10 indicates that consumers are most likely to derive their food safety information from television, newspapers and magazines or journals. Despite the significant growth in use of the internet, this was not identified as a major source of information of chicken-related food safety issues.

These results are in contrast to recent consumer surveys carried out by NZFSA during August 2003, May 2005 and July 2007 (New Zealand Food Safety Authority, 2003; 2005; 2007). The NZFSA survey asked respondents where they obtained most of their information from on food safety issues (n=750, multiple response).

<b>Source</b>	<b>August 2003 (%)</b>	<b>May 2005 (%)</b>	<b>July 2007 (%)</b>
Newspapers	49.5	44.1	40.2
TV Programmes	36.9	31.5	30.4
Magazines	19.7	18.3	14.7
Internet	3.9	7.2	11.9

While it may be tempting to conclude that food safety issues associated with chicken receive more television coverage than other foods, any comparative conclusions based on the current survey and the NZFSA surveys should be made with caution.

Table 11 gives details of the ‘other’ sources of food safety information.

**Table 11: Analysis of ‘other’ food safety information sources**

<b>OTHER FOOD SAFETY INFORMATION SOURCES</b>	
<i>Where else have you heard or read about food safety issues associated with chicken?</i>	
	<b>2008 (n=451) %</b>
Word of mouth	60
Pamphlets	8
Through my job	7
Supermarkets	6
Through education (school, university, course)	5
Doctors	5
Food outlets	3
Books	2
Personal experience	2
Hospitality industry	1
Information sheets from Plunket	1
Magazines	1
General knowledge/ Just know about it	0.4
Journals	0.4
Public health office	0.4
Internet	0.2
Unsure	3
Base: Those who have heard or read about food safety issues associated with chicken somewhere else; multiple response question	

Just under half (45%) of respondents reported getting information about chicken food safety issues from a source other than the five identified media sources. Word-of-mouth was by far the most commonly identified ‘other’ information source.

Although not specific to media sources or chicken safety, a face-to-face interview survey in Ireland of 1020 households asked the question “Where did you learn about food safety?” The responses were: from a parent, guardian or grandparent (52%), school (28%), experience (26%) and television (21%). In contrast, the percentages of responses citing brochures/food safety brochures were only 5.7 and 6% respectively, while Food Safety Agency was cited by only 3%.

Jay *et al.* (1999) asked 1203 Australian telephone survey respondents “How did you learn about food preparation?” The majority of responses were “Learned from parents” (61.0%), followed by experience (23.2%) and school (7.1%). There was a marked gender difference,

in that 65.2% of women compared to 45.3% of men said they received their training from their parents. In contrast, more men (35.4%) than women (19.9%) said they were self-taught.

#### 4.4 Chicken Purchasing, Freezing and Thawing Practices

The next set of questions relate to purchasing decisions and consumption of chicken and handling practices subsequent to purchase of chicken.

Table 12 gives the results of a question examining the frequency of meat consumption in general and chicken consumption in particular.

**Table 12: Frequency of meat and chicken consumption**

<b>MEAT CONSUMPTION FREQUENCY</b>		
<i>On average, how often would you consume meat of any sort (include beef, lamb, mutton, pork, chicken, deli meats, etc.)?</i>		
	<b>2008 (n=1,000)</b>	
	<i>On average, how often would you consume meat of any sort (include beef, lamb, mutton, pork, chicken, deli meats, etc.)?</i> %	<i>On average, how often do you consume chicken?</i> %
2 or more times per day	10	-
Once per day	33	2
5-6 times per week	26	3
2-4 times per week	28	47
Once per week	2	30
1 to 3 times per month	1	13
Less than once per month	-	4
Never	-	1
Unsure	-	-
Base: All respondents		

When compared with earlier data, these results indicate increased frequency of consumption of chicken in New Zealand. Food frequency information from the 1997 National Nutrition Survey indicated that at that time 42% of respondents consumed chicken 1-6 times per week (Russell *et al.*, 1999), while the current survey indicates that 80% of New Zealand consumers eat chicken 1-6 times per week.

An Irish study of approximately 300 consumers reported that 65% were frequent poultry consumers (at least twice per week), compared to 52% in the current survey (McCarthy *et al.*, 2004).

Table 13 summarises results of a question that examined the reasons why consumers purchase/consume chicken.

**Table 13: Consumer reasons for purchasing and consuming chicken**

<b>REASONS FOR BUYING/ EATING CHICKEN</b>	
<i>Of the following reasons, what is the MAIN reason you buy and/or eat chicken?</i>	
	<b>2008 (n=988) %</b>
I like the taste of chicken	37
It's convenient and versatile	24
It's a healthy, low fat food	19
It's good value for money	12
For variety	2
The birds are raised under good welfare conditions	1
I like the appearance of chicken	0.6
Dietary requirements	0.4
Buy it for children	0.4
Religious reasons	0.1
Buy it for guests (husband doesn't like chicken)	0.1
Unsure	2
Other - prior to 'other specify being used'	1
Base: Those who consume chicken	

Taste was the primary reason identified, although convenience, perceptions of healthiness and value for money were also reasons commonly identified.

In contrast, a focus group study (n=37) in Northern Ireland investigating consumer perceptions of poultry meat, found product appearance and convenience were the primary factors for choosing to buy chicken while price did not appear to be an important factor (Kennedy *et al.*, 2004). The study of McCarthy *et al.* (2004) concluded that health and eating enjoyment were major positive drivers of consumers' attitudes towards poultry consumption, while safety was a major negative driver.

Table 14 gives information on the forms of chicken purchased by respondents.

**Table 14: Form of chicken mostly purchased by consumers**

<b>TYPE OF CHICKEN PURCHASED BY CUT TYPE</b>	
<i>When you buy chicken, which ONE of the following do you MOSTLY buy...</i>	
	<b>2008 (n=988) %</b>
Boneless portions (e.g. breasts, thighs)	51
Whole birds	25
Portions with bones in (e.g. wings, legs)	21
Diced chicken	2
Minced chicken	0.3
Takeaway pieces	0.2
Don't buy chicken, we raise our own	0.1
Buy all types regularly	0.1
Rotisserie	0.1
Unsure	1
Base: Those who consume chicken	

According to these data, consumers mostly purchase chicken in the form of portions, either bone-in or boneless (71.3%). About a quarter of consumers reported mostly purchasing whole carcasses. In the Northern Ireland focus group study, whole chickens were thought to be wasteful and not to provide good value for money which is why breast fillets, although expensive, were perceived to be better value for money (Kennedy *et al.*, 2004). Chicken breasts were also favoured because they were not obviously from part of an animal.

In a postal questionnaire survey of 1000 households in the Netherlands, self-reported behaviour was sought on purchases of chicken (Bergsma *et al.*, 2007). From the 284 returned and usable questionnaires, chicken breast fillet was the most popular choice followed by drumsticks. Diced and marinated fillets were least popular. Health and absence of waste materials were given as primary factors for choosing breast fillets.

Table 15 summarises information on the state (raw, frozen, cooked, etc.) of chicken that consumers mostly purchase.

**Table 15: Preparation state of chicken purchased by consumers**

<b>TYPE OF CHICKEN PURCHASED BY PREPARATION STATE</b>	
<i>When you buy chicken from the supermarket, it can be cooked, frozen or fresh, which ONE of the following do you MOSTLY buy?</i>	
	<b>2008 (n=988) %</b>
Fresh, raw	63
Frozen raw	28
Cooked – rotisserie	5
Cooked – smoked chicken	1
Frozen precooked (such as chicken nuggets)	1
Cooked – served cold (like deli sliced)	0.2
Don't buy chicken, we raise our own	0.1
Unsure	1
Base: Those who consume chicken	

The data in Table 15 is highly consistent with an earlier postal survey carried out by ESR, that concluded that 63% of poultry purchases were of fresh, raw poultry (Gilbert *et al.*, 2007).

Data provided by the Poultry Industry Association of New Zealand (PIANZ) in 2007 to support a quantitative risk model (Lake *et al.*, 2007) provide lower but very similar figures to those collected by this survey. The PIANZ data indicates that of the products purchased for domestic consumption, 58% is fresh raw poultry and 24% is frozen. The PIANZ data indicates that 18% of poultry purchased for domestic consumption is pre-cooked. This is a higher proportion than indicated in Table 15, and may reflect consumers' focus on chicken recognisable as such, rather than as a processed product such as chicken nuggets.

In the Northern Ireland focus group study, there was a preference for purchasing raw chicken over cooked (Kennedy *et al.*, 2004). This was explained by the consumer being better able to assess the chicken quality. There was also a belief that by cooking the chicken themselves, any perceived risks could be much better controlled.

The next set of questions summarised in Tables 16 to 19 relate to storage and use of chicken in the home.

Table 16 gives results of a question asked of those who reported mostly purchasing frozen chicken, as to how long the chicken was maintained frozen.

**Table 16: Length of time frozen chicken is kept in the freezer**

<b>LENGTH OF TIME FROZEN CHICKEN KEPT IN FREEZER</b>	
<i>For chicken brought frozen, typically how long would you keep it in your freezer?</i>	
	<b>2008 (n=279) %</b>
Chicken will be thawed the same day it is bought	6
Chicken will be stored frozen for less than one week	29
Chicken will be stored frozen for one to four weeks	47
Chicken will be stored frozen for 1 to 6 months	18
Chicken will be stored frozen for longer than 6 months	-
Unsure	-
Base: Those who buy frozen chicken	

The majority of respondents (65%) reported keeping frozen chicken frozen for at least one week. No similar study could be located reporting on these parameters concerning chicken.

While different question structures do not allow direct comparisons, these results are qualitatively similar to a small Dutch survey (23 respondents) concerning meat storage (Damen and Steenbekkers, 2007). The majority of respondents who froze meat kept the meat in the freezer for between two weeks and one month. Most respondents did not distinguish between different meat types with respect to freezing practices.

Table 17 summarises information on the thawing procedures used by consumers who purchase chicken frozen.

**Table 17: Method of thawing frozen chicken for consumer who purchase chicken frozen**

<b>THAWING FROZEN CHICKEN PROCESS</b>	
<i>When thawing chicken what do you usually do?</i>	
	<b>2008 (n=279) %</b>
Thaw in the refrigerator	40
Thaw on the bench or elsewhere at room temperature	31
Defrost in the microwave	15
Defrost in the sink covered with cold water	8
Unsure	6
Base: Those who buy frozen chicken	

Thawing chicken in the refrigerator was the most common practice, followed by thawing on the bench. These results suggest a change in consumer behaviour compared to a 2005 postal survey, in which 46% of respondents reported thawing meat or poultry at room temperature, while only 26% reported thawing meat or poultry in the refrigerator (Gilbert *et al.*, 2007).

To obtain the full picture of defrosting practices, these results need to be read in conjunction with Table 19 results (purchased chicken fresh, frozen at home and then defrosted).

Australian telephone survey participants indicated that 40.1% would thaw meat at room temperature, 34.4% in the refrigerator, 2.2% in running water, 18.5% used a microwave oven, 1.2% cooked meat from frozen and 3.6% did not use frozen meat (Jay *et al.* (1999), n= 1,203).

In a questionnaire survey of 1020 households in Ireland (Kennedy *et al.*, 2005), the majority defrosted meat at room temperature (56.2%), followed by in the refrigerator (23.4%) and microwave oven (13.1%) (note: numbers total 92.7%). Presumably the question was not applicable to the remaining 7.3% of households.

The small Dutch survey found that the majority of respondents (12/23 = 52%) reported thawing meat in the refrigerator, while 6/23 (26%) defrosted meat on the kitchen worktop (Damen and Steenbekkers, 2007). One person (4%) defrosted meat in a microwave.

Table 18 summarises how fresh chicken is used in consumers' homes.

**Table 18: Use practices for chicken bought fresh by consumers**

<b>USE OF CHICKEN BOUGHT FRESH</b>	
<i>For chicken bought fresh, which of the following BEST DESCRIBES what you usually do?</i>	
	<b>2008 (n=626) %</b>
Cook and eat the chicken on same day	29
Refrigerate then eat within 2 to 3 days	16
Refrigerate then eat within a week	3
Refrigerate then eat after more than 1 week	-
Cook some and freeze the rest	14
Put all of it into freezer after I return from shopping	35
Refrigerate and if not eaten in 2 to 3 days, then put into freezer	2
Refrigerate and if not eaten during the week, then put into the freezer	-
Unsure	1
Base: Those who buy chicken fresh	
	<b>2008 (n=321) %</b>
Chicken will be stored frozen for less than one week	22
Chicken will be stored frozen for one to four weeks	64
Chicken will be stored frozen for 1 to 6 months	12
Chicken will be stored frozen for longer than 6 months	1
Unsure	1
Base: Those who 'Cook some and freeze the rest' OR 'Put all of it into freezer after I return from shopping' OR 'Refrigerate and if not eaten in 2 to 3 days, then put into freezer'	

For consumers who purchase chicken fresh (unfrozen) the most common practice was to freeze the chicken at home on the same day as purchase (35%), followed by cooking and eating the same day (29%). Overall, 51% of respondents reported that they would freeze all or part of the chicken purchase, at some point. An earlier ESR postal survey resulted in an estimate of 64% of fresh poultry purchases being frozen in the home (Gilbert *et al.*, 2007).

In the current study, of those who reported freezing fresh chicken purchases, 77% reported that they would usually store the chicken frozen for a period of at least one week. This compares to 65% of consumers in the current survey who purchased chicken frozen and then store the purchase frozen for at least one week.

Table 19 summarises the defrosting practices employed by respondents who purchased chicken fresh and subsequently froze it in the home.

**Table 19: Method of thawing frozen chicken for consumer who purchase chicken fresh and froze it in the home**

<b>THAWING FROZEN – FRESH CHICKEN PROCESS</b>	
<i>When thawing frozen chicken that was bought fresh, what do you usually do?</i>	
	<b>2008 (n=321) %</b>
Defrost in the microwave	25
Thaw in the refrigerator	44
Thaw on the bench or elsewhere at room temperature	35
Defrost in the sink covered with cold water	4
I don't defrost, I cook from frozen	3
Unsure	-
Other	-
Base: Those who 'Cook some and freeze the rest' OR 'Put all of it into freezer after I return from shopping' OR 'Refrigerate and if not eaten in 2 to 3 days, then put into freezer'	

Consumers who purchased chicken fresh and froze it in the home were most likely to thaw chicken in the refrigerator, in line with NZFSA recommendations. The NZFSA recommend that food is defrosted so that the temperature of the thawing food is kept below 4°C (see NZFSA website; [www.nzfsa.govt.nz](http://www.nzfsa.govt.nz) “Freezing and thawing food” factsheet).

#### **4.5 Attitudes Towards Potential Chicken Risk Management Strategies**

The last set of questions probed levels of acceptance and willingness to pay for various risk management interventions to prevent food poisoning.

Tables 20 and 21 summarise the results of a question asking consumers whether they would purchase frozen chicken if no fresh chicken was available.

**Table 20: Likelihood of purchasing frozen chicken if no fresh chicken was available**

<b>LIKELIHOOD OF PURCHASING FROZEN CHICKEN IF NO FRESH CHICKEN AVAILABLE</b>	
<i>If only frozen raw chicken and no fresh chilled chicken was available, would you buy the frozen chicken?</i>	
	<b>2008 (n=988) %</b>
Yes, you would buy it	58
No, you would not buy it	15
OR You would buy only because there is no other option	26
Unsure	1
Base: Those who consume chicken	

**Table 21: Likelihood of purchasing frozen chicken if no fresh chicken was available – fresh chicken purchasers only**

<b>LIKELIHOOD OF BUYING FROZEN CHICKEN IF ONLY FROZEN CHICKEN IS AVAILABLE</b>	
<i>You've told me you mainly buy fresh chicken. One of the ways of controlling Campylobacter and Salmonella is to freeze ALL chicken so that only frozen chicken is available. Using a 1 to 5 scale where 1 means very likely to buy it and 5 means not likely to buy it at all, can you tell me how likely it is that you would buy this chicken?</i>	
	<b>2008 (n=626) %</b>
1 Very likely to buy it	35
2	17
<b>TOTAL LIKELY (1+2)</b>	<b>52</b>
<b>3</b>	<b>24</b>
4	11
5 Not likely to buy it at all	12
<b>TOTAL NOT LIKELY (4+5)</b>	<b>23</b>
Unsure	1
Base: Those who buy chicken fresh/ raw	

In total, 84% of all respondents reported that they would purchase frozen chicken if only frozen chicken was available. However, of those who normally purchase chicken fresh, only 52% reported that they would be likely to purchase chicken if only frozen chicken was

available, while another 24% gave an equivocal response (3 on a scale where 1 = highly likely and 5 = highly unlikely).

These indicated consumer intentions may not translate into behaviour. In a study of consumer attitudes and behaviour towards fresh meat (poultry and pork) before and after the Belgian dioxin crisis in January 1999, it was found that although 30% of consumers reported in 1998 the intention to decrease meat consumption, in 1999 poultry and pork meat consumption slightly increased, and beef consumption stabilised (although total fresh meat consumption declined slightly) (Verbeke, 2001).

Table 22 summarises the responses of consumers when asked about the main disadvantages of frozen chicken compared to fresh chicken.

**Table 22: Disadvantages of frozen chicken**

<b>DISADVANTAGES WITH FROZEN CHICKEN</b>	
<i>In your experience which of the following do you believe is the MAIN DISADVANTAGE with frozen chicken?</i>	
	<b>2008 (n=988) %</b>
Not as convenient as fresh meat because needs defrosting	44
Loss of quality, such as loss of taste or drier texture	21
Thawing chicken juice is unsafe around the kitchen	14
Need to buy a freezer, storage expense	4
Don't know how long it has been frozen for	0.4
The cut I want is not available frozen	0.4
Buying by weight therefore you are paying for water plus chicken	0.3
Frozen chicken has bones in it	0.1
Don't like processed chicken	0.1
Only buy free range	0.1
Unsure	2
None	14
Base: Those who consume chicken	

Loss of convenience was by far the most frequently reported disadvantage identified with frozen chicken, followed by a perceived loss of quality. It is interesting to note that approximately 14% recognised that chicken juices could constitute a wider hazard in the kitchen environment.

In a Dutch study on the freezing of meat, in general, reduced taste was identified as the main disadvantage of freezing (Damen and Steenbekkers, 2007).

Tables 23 and 24 give results from a question that probed the consumer acceptability of different risk management strategies for the control of pathogenic bacteria on chicken.

**Table 23: Likelihood of purchasing chicken following various bacterial control strategies**

<b>LIKELIHOOD OF PURCHASING CHICKEN IF TREATED BY THE FOLLOWING METHODS (SUMMARY)</b>	
<i>As you may be aware the presence of these bacteria (Campylobacter and Salmonella) on chicken can be controlled by a range of methods. For each of the following methods, please use a 1 to 5 scale where 1 means very likely to buy it and 5 means not likely to buy it at all, can you tell me how likely it is that you would buy this chicken?</i>	
	<b>2008 (n=988) %</b>
Chicken from farms with stricter farm management practices	57
Freezing all chicken at processing plants (so that only frozen chicken is available)*	52
Freezing all chicken at processing plants (so that only frozen chicken is available) – <b>all chicken consumers</b>	52
Chicken that has been irradiated to remove bacteria	19
Fresh chicken that is chemically treated like dipping chicken in anti-bacterial solutions	8
Base: Those who consume chicken * Base (n=362) who buy chicken that is frozen raw, cooked rotisserie, cooked smoked, frozen precooked and cooked served cold (like deli-sliced) <b>not</b> fresh/raw chicken.	

Control through stricter farm management practices was the most acceptable strategy offered, while use of chemical treatments was the least acceptable.

The data on the acceptability of freezing in Tables 23 and 24 needs some explanation. This question had already been put to the 626 purchasers of fresh raw chicken (see Table 21) and was not repeated. Therefore, the results from this question show the responses of consumers that do not usually purchase fresh/raw chicken (n=362). In Table 23, the following line then gives the results for all chicken consumers (988), that includes the 626 responses from the fresh/raw chicken purchasers. The result of 52% in both sample sets in Table 23 is coincidental.

**Table 24: Likelihood of purchasing chicken following various bacterial control strategies - detail**

<b>LIKELIHOOD OF PURCHASING CHICKEN IF TREATED BY THE FOLLOWING METHODS</b>									
<i>As you may be aware the presence of these bacteria (Campylobacter and Salmonella) on chicken can be controlled by a range of methods. For each of the following methods, please use a 1 to 5 scale where 1 means very likely to buy it and 5 means not likely to buy it at all, can you tell me how likely it is that you would buy this chicken?</i>									
	<i>Base</i>	<b>1 – Very likely to buy it %</b>	<b>2 %</b>	<b>TOTAL AGREE 1+2 %</b>	<b>3 %</b>	<b>4 %</b>	<b>5 – Not likely to buy it at all %</b>	<b>TOTAL DISAGREE 4+5 %</b>	<b>Unsure %</b>
Chicken from farms with stricter farm management practices	988	38	19	<b>57</b>	<b>18</b>	6	15	<b>21</b>	4
Freezing all chicken at processing plants (so that only frozen chicken is available) <b>(non-fresh/raw purchasers)</b>	362*	37	15	<b>52</b>	<b>25</b>	6	16	<b>22</b>	1
Freezing all chicken at processing plants (so that only frozen chicken is available) <b>(fresh/raw purchasers - see Table 21)</b>	626	35	17	<b>52</b>	<b>24</b>	11	12	<b>23</b>	1
Freezing all chicken at processing plants (so that only frozen chicken is available) <b>all chicken consumers</b>	988	36	16	<b>52</b>	<b>24</b>	10	13	<b>23</b>	1
Chicken that has been irradiated to remove bacteria	988	11	8	<b>19</b>	<b>18</b>	13	43	<b>56</b>	7
Fresh chicken that is chemically treated like dipping chicken in anti-bacterial solutions	988	4	4	<b>8</b>	<b>11</b>	16	61	<b>77</b>	4
Base: Those who consume chicken * Base: n=362 who buy chicken that is frozen raw, cooked rotisserie, cooked smoked, frozen precooked and cooked served cold (like deli-sliced) <b>not</b> fresh/raw chicken.									

**Table 25: Consumer willingness to pay for different bacteria control methods for chicken**

<b>AMOUNT WILLING TO PAY FOR DIFFERENT BACTERIA CONTROL METHODS FOR CHICKEN</b>					
<i>As you may be aware the presence of these bacteria (Campylobacter and Salmonella) on chicken can be controlled by a range of methods. For each of the following methods, please use a 1 to 5 scale where 1 means very likely to buy it and 5 means not likely to buy it at all, can you tell me how likely it is that you would buy this chicken?</i>					
	<b>I wouldn't buy it</b>	<b>I would only buy it if were 10% - 20% cheaper</b>	<b>Pay the same</b>	<b>I'd pay 10% - 20% more</b>	<b>Unsure</b>
	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>	<b>%</b>
Chicken from farms with stricter farm management practices	13	9	47	27	4
Freezing all chicken at processing plants (so that only frozen chicken is available)	14	22	53	8	3
Fresh chicken that is chemically treated like dipping chicken in anti-bacterial solutions	65	10	17	4	4
Chicken that has been irradiated to remove bacteria	48	11	28	7	6
Base: Those who consume chicken (n=988)					

In Table 24, the results from the freezing question are broken down into the two base subsamples of 362 and 626 respondents (non fresh/raw and fresh/raw purchasers respectively). These results are then totalled in the following line of the table.

Table 25 presents results from a question that asked whether consumers would be willing to pay more for safer chicken using various pathogen control methods.

Approximately one-quarter of respondents were prepared to pay a premium for safer chicken, when the improved safety was achieved through better farm management. Chemical treatment and irradiation as control measures were generally not well accepted, with 65% and 48% of respondents, respectively, stating that they would not purchase poultry treated by these practices.

No studies have been located that investigate consumer willingness-to-pay for poultry risk management interventions involving farm management, freezing, or chemical treatments. A US FoodNet Population Survey study in 1998-1999 found that just over 50% of respondents were not willing or unsure about buying irradiated meat or poultry. Of those willing to buy the irradiated ground beef or poultry, approximately 25% would pay more, 7% would not pay more, and 17% were unsure about paying more (Frenzen *et al.*, 2000).

The introduction of certified *Campylobacter*-free chicken meat on the Danish market was not a success; consumers were apparently not willing to pay more for such a product (Mangen *et al.*, 2007). Overall, it appears that the majority of consumers are reluctant to pay a premium for food safety risk management measures.

## 5 DISCUSSION

There was some potential for bias in the survey. The use of landline telephone interviews means the geographically mobile, those in rented accommodation and lower-socio-economic groups are likely to be under-represented. However, as more than 90% of New Zealanders have access to a landline, the bias is considered to be modest.

The demographics of the 1000 respondents were generally consistent with that of the overall New Zealand population. The greatest difference was in gender balance, as might be expected. Results were not adjusted for this difference, as the survey target was those people purchasing and preparing chicken.

The overall co-operation rate was 19.1% and this was considered typical for a non-incentivised telephone survey. It is also consistent with a recent telephone survey on acute gastrointestinal illness (Adlam *et al.*, 2007).

The practice of randomising the order of possible answers was part of the interviewers brief. This was principally in order to limit the bias in the list of available choices.

It is well recognised that respondents will often report their idealised behaviour, rather than actual behaviours in an interview situation. In this survey, consumers were asked for mostly factual rather than subjective information, such as their preferences and purchasing behaviours. Where comparisons can be made, the results were generally consistent with other New Zealand and overseas surveys.

In this context, the final set of questions on acceptability and response to various risk management measures is likely to be the aspect of the survey where this is most potential for a variation between reported and actual behaviour. While consumers may feel that it is 'right' to pay a premium for safer food, overseas experience suggests that this is not the case in practice (Mangen *et al.*, 2007).

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**APPENDIX 1: COMPUTER ASSISTED TELEPHONE INTERVIEW QUESTIONNAIRE**

**CATI Questionnaire**

**Food Knowledge, Opinions and Handling Project**

Int ID \_\_\_\_\_ Market \_\_\_\_\_

Phone no. \_\_\_\_\_ Sex \_\_\_\_\_ Male .... 1  
Female... 2

Date \_\_\_\_\_

Start time \_\_\_\_\_ Finish time \_\_\_\_\_

Call 1 2 3 4

INTRO Hello, my name is %INAME%. I'm calling on behalf of the New Zealand Food Safety Authority. We are conducting a national research survey about food safety issues, the results from this research will be used to improve food safety for New Zealanders. The research focuses on your usual buying practices and handling of food, especially meat. The interview is confidential and takes about 10 minutes

We would like to select one person in your household to be interviewed who is over 18 years of age and buys and prepares food including meat. [Establish whether person fits this description] IF NO, EXIT LINE

ADULTYES Would you be happy to take part in this survey?  
 Yes.....1 Are you vegetarian ? If Yes Exit Line, If No GO TO Q1BEGIN  
 No.....2  
 Unsure.....3, repeat reasons for call again, is it a convenient time?

If they are happy to take part but not a convenient time, agree a convenient call-back time

IF ADULTYES='No' OR ADULTYES='Unsure' SAY EXIT LINE

Thank you for your time. Good bye

Q1BEGIN CONTINUE

The following questions are about you and your household and are for statistical purposes only

Q1B INTERVIEWER: Enter gender of respondent  
 Male 1  
 Female 2

ASK ALL

Q2 Which age group are you in?  
 18 years or less  
 19-24 years  
 25-44 years

45-64 years  
65 years or more

---

Q3 How many people (including children) are in your household, including you?

\_\_\_\_\_

---

Q4 Are you the person who most often buys food for the household?

Yes 1  
No 2  
Other 3

---

Q5 Are you the person in the household who most often prepares food for the household?

Yes 1  
No 2  
Other 3

---

\*\*\*\*\* NEW QUESTION \*\*\*\*\*

---

Q6 Symptoms of food poisoning include vomiting, diarrhoea, stomach pains and so on. We can encounter food poisoning bugs via many different foods. Can you rate the following list of foods from '1= Very likely to cause food poisoning' to '5 = Very unlikely to cause food poisoning'

	1	2	3	4	5
Fresh fruit and vegetables					
Milk and dairy products					
Beef					
Pork					
Chicken					
Lamb/mutton					
Processed meats (e.g. ham, bacon, salami, deli meats)					

---

Q7 Do you associate any of the following food safety issues with eating chicken? (More than one can be chosen)

Food additives	yes/no
Pesticide residues	yes/no
Heavy metals	yes/no
Food poisoning	yes/no
Hormones	yes/no
Don't know	yes

---

Q8 Food poisoning is usually caused by bacteria or viruses. Which of the following would you associate with eating chicken?

Norovirus	yes/no
Salmonella	yes/no
Campylobacter	yes/no
E. coli O157	yes/no
Giardia	yes/no

---

Q9 Where have you heard about food safety issues associated with chicken? (More than one can be selected)

Television	1
Radio	2
Newspaper	3
Journals and magazines	4
Internet	5
Other .. _____	

---

This next set of questions relates to meat, your buying practices at the butchers or supermarket and your eating preferences.

---

Q10	On average, how often would you consume meat of any sort (include beef, lamb, mutton, pork, chicken, deli meats, etc.)?	
	2 or more times per day	1
	Once per day	2
	5-6 times per week	3
	2-4 times per week	4
	Once per week	5
	1 to 3 times per month	6
	Less than once per month.	7
	Unsure	8

---

Q11 On average, how often do you consume chicken?

	2 or more times per day	1
	Once per day	2
	5-6 times per week	3
	2-4 times per week	4
	Once per week	5
	1 to 3 times per month	6
	Less than once per month	7
	Never	8
	Unsure	9

---

\_\_ If= 'Never', go to EXIT Line

---

Q12	Of the following reasons, what is the main reason you buy and/or eat chicken? (randomise order)	
	It's good value for money	1
	Its a healthy, low fat food	2
	I like the taste of chicken	3
	I like the appearance of chicken	4
	Its convenient and versatile	5
	The birds are raised under good welfare conditions	6
	Other	7
	Don't know	8

---

Q13 When you buy chicken, do you **mostly** buy;

	Whole birds	1
	Portions with bones in (e.g. wings, legs)	2
	Boneless portions (e.g. breasts, thighs)	3
	Minced chicken	4
	Diced chicken	5
	Unsure.	6

---

Q14 When you buy chicken from the supermarket, do you **mostly** buy;

	Frozen raw	1
	Frozen precooked (such as chicken nuggets)	2
	Fresh, raw	3
	Cooked – rotisserie	4
	Cooked – served cold (like deli sliced)	5
	Cooked – smoked chicken	6
	Unsure	7

---

IF Q14 = 1, ask Q14A and Q14B

---

Q14A For chicken brought frozen, typically how long would you keep it in your freezer?

---

Chicken will be thawed the same day it is bought	1
Chicken will be stored frozen for less than one week	2
Chicken will be stored frozen for one to four weeks	3
Chicken will be stored frozen for 1 to 6 months	4
Chicken will be stored frozen for longer than 6 months	5
Unsure	6

---

Q14B When thawing frozen chicken what do you usually do

Defrost in the microwave	1
Thaw in the refrigerator	2
Thaw on the bench or elsewhere at room temperature	3
In sink covered with cold water	4
Unsure	5

---

IF Q14 = 3

Q14C For chicken bought fresh, which of the following best describes what you usually do?

Cook and eat the chicken on same day	1
Refrigerate then cook and eat within 2 to 3 days	2
Refrigerate then cook and eat within a week	3
Refrigerate then cook and eat after more than 1 week	4
Cook some and freeze the rest	5
Put all of it into freezer after I return from shopping	6
Refrigerate if not eaten in 2 to 3 days, then put into freezer	7
Refrigerate if not eaten during the week, into the freezer	8
Unsure	9

---

If answered 5,6 or 7 from question 16C above, follow with question 16D and 16E

Q14D If chicken bought fresh was frozen once you got it home, which of the following best describes the usual practice in your household?

Chicken will be stored frozen for less than one week	1
Chicken will be stored frozen for one to four weeks	2
Chicken will be stored frozen for 1 to 6 months	3
Chicken will be stored frozen for longer than 6 months	4
Unsure	5

---

Q14E When thawing frozen chicken what is your usual practice?

Defrost in the microwave	1
Thaw in the refrigerator	2
Thaw on the bench or elsewhere at room temperature	3
In sink covered with cold water	4
Unsure	5

---

Q15 If only frozen raw chicken and no fresh chilled chicken was available, would you buy the frozen chicken?

Yes, certainly	1
Yes, but only because there's no other option	2
No, I would not buy frozen raw chicken	3

Q15A Do you see any disadvantages with frozen chicken? \_\_\_\_\_

Loss of quality and taste, drier texture?	1
Not as convenient as fresh meat because needs defrosting	2
Thawing chicken juice is unsafe around the kitchen	3
Need to buy a freezer, storage expense	4
Other, please give reason	5 _____

Q16 Raw chicken bought by consumers may often carry the bacteria *Campylobacter* and may occasionally carry the bacteria *Salmonella*. Please rate your level of concern about this statement?

- |                    |   |
|--------------------|---|
| Very concerned     | 1 |
| Quite concerned    | 2 |
| Slightly concerned | 3 |
| Not concerned      | 4 |
| Don't know         | 5 |

Q17 The presence of these bacteria (*Campylobacter* and *Salmonella*) on chicken can be controlled by certain methods. For each of the methods given can you tell me if you would buy this chicken?

1= No, I wouldn't buy it

2= I'm less likely to

3= I'd buy it about the same as I do now

4= Yes I would be more likely to buy it

1            2            3            4

Stricter farm management practices

Freezing of all chicken at the processing plants (only frozen chicken available)

Chemical treatment of chicken like dipping in anti-bacterial solutions (fresh chicken)

Irradiation of chicken

Q18 If you saw chicken at the supermarket that had been treated by one of the four methods I've just mentioned, and the chicken was safer because it had less harmful bacteria on it, what would you pay for it?

1 = No, I wouldn't buy it

2 = I'd pay 10-20% less

3 = Pay the same

4 = I'd pay 10%-20% more

1            2            3            4

Stricter farm management practices

Freezing of all chicken at the processing plants

Chemical treatment of chicken like dipping in anti-bacterial solutions

Irradiation of chicken

Thank you! That's the end of the interview. Everyone's answers from this research will be combined to give us information about food safety knowledge and practices in New Zealand. The result of this survey will be published on the New Zealand Food Safety Authority website after all the interviews are complete. If you have any queries about the content of the survey you can contact Peter Cressey (03) 351 6019 and if you have any queries on how the survey was administered you can ring my supervisor. Thank you very much for your time.

## **APPENDIX 2: UMR QUALITY ASSURANCE PROCESSES**

### **ESR-Handling Meat Project**

**February 2008 – May 2008**

#### **■ Briefings**

The project has run smoothly over the three months of interviewing with a stable interviewing team. There were no changes to the original interviewing team.

#### **■ Validations**

All interviewers have a sample of their interviews validated as part of the quality assurance process. A minimum of 10 percent of each Interviewers work is validated and documented. A representative sample of each Interviewer's work is validated and recorded in the validation report.

The validation process aims to validate data collected in the original interview either through direct observation of the Interviewer, or through a re-interview where key or eligibility questions are asked a second time. This validation process ensures a high level of quality control.