

2nd Quarter National Survey 2001 (NS2):

Refrigerated Cooked Chicken Pieces

Executive Summary

Background

- Refrigerated cooked chicken pieces were tested for *Campylobacter*, *Salmonella* and *S. aureus*.
- In recent years it has been recognised in Ireland that *Campylobacter* is the leading cause of food borne gastroenteritis and far exceeds *Salmonella* as a cause of food-borne illness. The prevalence of *Campylobacter* in raw poultry is well documented, however, only limited data is available on its incidence in ready-to-eat foods. Therefore, the emphasis of this study was on *Campylobacter* testing. Testing for *Salmonella* was optional. *S. aureus* was monitored as an indicator of poor hygiene and poor food handling practices.
- Sampling took place during April, May and June of 2001. A total of 534 samples of cooked chicken pieces were tested. 512 of these samples were tested for *Campylobacter*, 529 for *Salmonella* and 432 for *S. aureus*.

Results

- *Salmonella* and *Campylobacter* were not detected in any of the samples tested. This finding is very encouraging. Presence of these pathogens would be indicative of either under cooking or cross-contamination from raw to ready-to-eat foods. Table 1 represents the findings in relation to *S. aureus*.

Table 1: Microbiological quality (*S. aureus*) of refrigerated cooked chicken pieces

Microbiological quality	Satisfactory < 20 cfu/g	Acceptable 20-< 100 cfu/g	Unsatisfactory 100-< 10 ⁴ cfu/g	Unacceptable/potentially hazardous ≥ 10 ⁴ cfu/g
Number of samples (%)	415 (96)	5 (1.2)	11 (2.6)	1 (0.2)

- The presence of *S. aureus* at unsatisfactory and unacceptable/potentially hazardous levels suggests that emphasis must continue to be placed on good food handling practices at all stages during the processing and storage of these commodities.

Report of 2nd Quarter National Survey 2001 (NS1):

Refrigerated cooked chicken pieces

Summary

A total of 534 cooked chicken samples were tested in this study. 512 samples were tested for *Campylobacter*, 529 for *Salmonella* and 432 for *Staphylococcus aureus*. *Salmonella* and *Campylobacter* were not detected in any sample. 11 samples were unsatisfactory and one sample unacceptable / potentially hazardous for *S. aureus*.

Introduction

This study investigated the microbiological quality of refrigerated cooked chicken pieces from retail shops and manufacturers selling primarily to the final consumer such as delicatessens and sandwich counters. Sampling took place during April, May and June of 2001. Samples were tested for the presence of *Campylobacter* and *Salmonella* and were enumerated for *S. aureus*.

The incidence of disease caused by *Salmonella* has been steadily decreasing over the past few years, however, *Campylobacter* (a relatively recently recognised human pathogen) is now considered to be the leading cause of bacterial food poisoning. The National Disease Surveillance Centre (NDSC) has collated information since 1999 on the incidence of laboratory confirmed campylobacteriosis (disease caused by *Campylobacter*). The number of laboratory confirmed cases of campylobacteriosis in 1999 and 2000 were 2085 and 1613 respectively ^(1,2). This is approximately twice the number of notifications of infection with *Salmonella enterica* (965 and 640 respectively). Preliminary figures for campylobacteriosis in 2001 are 1303 cases.

Campylobacter spp. are widespread in the intestinal tract of warm blooded animals used for food production and in the alimentary tract of poultry. In Ireland, the Department of Agriculture and Food in association with the Food Safety Authority of Ireland (FSAI) have been sampling poultry for *Campylobacter* infection since 1999. To date the average isolation rate is 55% (n=7,000), ranging from 27-60% depending on the species of bird examined (56% for chicken) and the type of sample examined (carcasses/skinless fillets) ⁽³⁾.

The prevalence of *Campylobacter* spp. in raw poultry is well documented, however, only limited data is available on its incidence in ready-to-eat foods. Therefore, the emphasis of this survey was to determine the incidence of *Campylobacter* in ready-to-eat chicken. Testing for *Salmonella* was optional. Levels of *S. aureus* (commonly associated with the skin and nose of healthy individuals) were monitored as an indicator of hygiene and food handling practices.

Specific objectives

- To examine the microbiological quality of refrigerated cooked chicken pieces.
- To include, where possible, recording of sample storage temperature.
- To improve national survey methodology.

Method

Sample source: Samples were collected from 2 types of food business:

- Retailers and
- Manufacturers selling primarily direct to the final consumer.
In particular, delicatessen and sandwich counters from the above business categories.
[Food businesses are categorised in the FSAI Code of Practice No. 1 ⁽⁴⁾].

Sample description:

- Cooked chicken which was diced / sliced / shredded and stored at refrigeration temperatures.
- Excluded: chicken with sauces added such as mayonnaise and chicken products such as coronation chicken and chicken tikka.

Sample collection and analysis:

Environmental Health Officers (EHOs) from the various health boards (Appendix 2) collected samples. The samples were analysed for *Campylobacter*, *Salmonella* and *S. aureus* in one of the 7 Official Food Microbiology Laboratories (OFMLs – Appendix 3) using an approved / standard method (methods accredited by the National Accreditation Board). Results were interpreted using the FSAI microbiological guidelines ⁽⁵⁾ and samples were categorised as appropriate.

Results:

Table 1: Number of samples from each health board

Health board [Ⓜ]	Number of samples
ERHA	121
MHB	36
MWHB	48
NEHB	68
NWHB	63
SEHB	66
SHB	71
WHB	61
TOTAL	534

Table 2a: Microbiological quality[Ⓟ] of samples according to health board – *Campylobacter* and *Salmonella*

Health board [Ⓜ]	<i>Campylobacter</i>		<i>Salmonella</i>	
	Number of samples tested	Satisfactory not detected in 25g (%)	Number of samples tested	Satisfactory not detected in 25g (%)
ERHA	117	117 (100)	121	121 (100)
MHB	35	35 (100)	36	36 (100)
MWHB	48	48 (100)	43	43 (100)
NEHB	65	65 (100)	68	68 (100)
NWHB	62	62 (100)	63	63 (100)
SEHB	66	66 (100)	66	66 (100)
SHB	58	58 (100)	71	71 (100)
WHB	61	61 (100)	61	61 (100)
TOTAL	512	512 (100)	529	529 (100)

[Ⓜ] See Appendix 2 for details of health boards

[Ⓟ] Microbiological quality was interpreted using the FSAI microbiological guidelines ⁽⁵⁾

Table 2b: Microbiological quality^ϕ of samples according to health board – *S. aureus*

Health board [Ⓜ]	Number of samples tested	Satisfactory < 20 cfu/g (%)	Acceptable 20 - < 100 cfu/g (%)	Unsatisfactory 100 - < 10 ⁴ cfu/g (%)	Unacceptable/potentially hazardous ≥ 10 ⁴ cfu/g (%)
ERHA	56	56 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
MHB[‡]	0	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
MWHB	48	47 (97.90)	0 (0.00)	1 (2.10)	0 (0.00)
NEHB	68	65 (95.59)	0 (0.00)	3 (4.41) ^Ω	0 (0.00)
NWHB	63	63 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
SEHB	66	63 (95.45)	3 (4.55)	0 (0.00)	0 (0.00)
SHB	70	60 (85.71)	2 (2.86)	7 (10.00)	1 (1.43)
WHB	61	61 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)
TOTAL	432	415 (96.06)	5 (1.16)	11 (2.55)	1 (0.23)

^ϕ Microbiological quality was interpreted using the FSAI microbiological guidelines ⁽⁵⁾

[Ⓜ] See Appendix 2 for details of health boards

[‡] Test for *S. aureus* was not preformed as there was a misunderstanding as to which of the 3 tests was optional

^Ω A sample with a count of >1.0x 10³ cfu/g was classified as unsatisfactory

Table 3: Details of samples unsatisfactory and unacceptable / potentially hazardous for *S. aureus*

<i>S. aureus</i> cfu/g	Microbiological quality ^φ	Sample description	Date sample taken	Health board ^ψ
1.50×10^2	Unsatisfactory	Cooked chicken	24/04/2001	NEHB
1.86×10^2	Unsatisfactory	Cooked chicken	28/05/2001	SHB
1.92×10^2	Unsatisfactory	Cold cooked chicken	21/05/2001	SHB
2.00×10^2	Unsatisfactory	Cooked chicken	17/04/2001	SHB
$< 2.30 \times 10^2$	Unsatisfactory	Cooked chicken	03/07/2001	NEHB
2.36×10^2	Unsatisfactory	Cooked chicken	02/04/2001	SHB
2.40×10^2	Unsatisfactory	Cooked chicken	22/05/2001	MWHB
2.60×10^2	Unsatisfactory	Cold cooked chopped chicken	26/05/2001	SHB
2.66×10^2	Unsatisfactory	Cooked chicken pieces	23/04/2001	SHB
1.00×10^3	Unsatisfactory	Chicken pieces	22/05/2001	SHB
$> 1.00 \times 10^3$	Unsatisfactory	Cooked chicken	28/05/2001	NEHB
1.01×10^4	Unacceptable / Potentially hazardous	Chicken pieces	29/05/2001	SHB

- All samples tested were satisfactory for *Salmonella* (n = 529) and *Campylobacter* (n = 512). Due to the sample size, this finding can be expressed in terms of a maximum contamination rate below which we are 95% certain the true rate of contamination lies. Thus the contamination rate is < 0.56% for *Salmonella* and < 0.58% for *Campylobacter*.
- 96.06 % (n = 415) of samples tested were satisfactory, 1.16 % (n = 5) acceptable, 2.55 % (n = 11) unsatisfactory and 0.23 % (n = 1) unacceptable / potentially hazardous for *S. aureus*.
- All unsatisfactory samples and the unacceptable / potentially hazardous sample for *S. aureus* were tested for *Campylobacter* and *Salmonella* with the exception of:
 - i) An unsatisfactory sample from the SHB which was not tested for *Campylobacter* (categorised incorrectly)
 - ii) An unsatisfactory sample from the NEHB which was not tested for *Campylobacter* (insufficient sample)

^φ Microbiological quality was interpreted using the FSAI microbiological guidelines ⁽⁵⁾

^ψ See Appendix 2 for details of health boards

- iii) An unsatisfactory sample from the MWHB which was not tested for *Salmonella* (insufficient sample)
- The 11 unsatisfactory samples for *S. aureus* were from different premises.
- The unacceptable / potentially hazardous sample for *S. aureus* was obtained from a supermarket in the SHB area where an unsatisfactory sample was obtained over a month earlier. (The 2 samples were different product types, therefore the unacceptable / potentially hazardous sample could not be regarded as a repeat sample as defined in the survey protocol).

Discussion

The finding that the contamination rate is <0.56% for *Salmonella* and <0.58% for *Campylobacter* (95% confidence) is very encouraging. Presence of these pathogens is indicative of either under cooking or cross contamination from raw to ready-to-eat foods. This finding is similar to that of other studies.

A Northern Ireland study on the prevalence of thermophilic *Campylobacter* spp. in ready-to-eat foods and raw poultry, reported that thermophilic *Campylobacter* spp. was not isolated in any of the 1061 poultry related cooked products analysed ⁽⁶⁾. In the UK, a LACOTS (Local Authorities Coordinating Body on Food and Trading Standards)/PHLS (Public Health Laboratory Service) surveillance project ⁽⁷⁾ on the rate of contamination of ready-to-eat take-away chicken pieces with *Salmonella* and *Campylobacter* reported (a) the absence of *Salmonella* and (b) the isolation of *Campylobacter* in only one of 4055 samples (this sample was found to be undercooked). The product sampled was cooked ready-to-eat chicken (coated chicken was included but compound products were excluded). Another UK study undertaken by the Joint Food Safety and Standards Group on ready-to-eat meats and meat products ⁽⁸⁾ reported that *S. typhimurium* was detected in 2 samples and that *Campylobacter* was not detected in any of the samples tested (n = 758). Three categories of cooked-chilled chicken were examined: plain whole chicken, plain portioned chicken and value added portioned chicken.

The presence of *S. aureus* is indicative of poor hygiene and food handling practices. Using the Irish microbiology guidelines ⁽⁵⁾ 2.78 % (n = 12) of all chicken samples tested were found to be unsatisfactory or unacceptable / potentially hazardous for

S. aureus. This finding is similar to that of the first FSAI microbiology surveillance study ⁽⁹⁾ in which 1.90% (n = 10) of cakes and pastries with perishable fillings were classified in these 2 categories. The Joint Food Safety and Standards Group ⁽⁸⁾ detected *S. aureus* (≥ 10 cfu/g) in 5 samples (0.66%) of chicken.

In this study no correlation was made between the storage temperature of the samples *in situ* and its microbiological status. Also, this study did not examine

the microbiological quality of whole, portioned or value added chicken products. However, it has been shown that the microbiological quality of plain portioned cooked chicken is worse than that of plain whole chicken or value added portioned chicken ⁽⁸⁾.

The findings of this study suggest that controls are in place to ensure the chicken is adequately cooked and that cross contamination is prevented. These measures must be maintained and regularly reviewed to ensure that a microbiologically safe product reaches the consumer. However, the presence of *S. aureus* at unsatisfactory and unacceptable / potentially hazardous levels suggests that more emphasis must be placed on good hygiene practices at all stages during the processing and storage of cooked chicken products. Good hygiene practices must be practiced by both food handlers and non food handlers (whose duties and responsibilities could impinge on food safety). To minimise bacterial growth, emphasis should be placed on temperature control at all critical stages during the cook-chill process. These issues should be incorporated into a food safety management system based on the principles of HACCP.

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