

Campylobacter contamination in fresh whole UK-produced chilled chickens at retail: July – September 2015

This report presents the results of the UK Survey of Campylobacter contamination in fresh retail chicken and its packaging, for the period Jul-Sept 2015. These results are based on a total of 1,032 of fresh, whole, chilled, unflavoured chickens sampled at retail. The overall results are weighted to reflect retailer market share¹.

The present survey began at the start of July 2015 and will be running for a full 12 months. A planned 4,000 chickens will be sampled at retail and tested for their level of Campylobacter contamination. This present survey may be referred to as Year 2 as it follows on from an equivalent survey (Year 1) which was intended to represent the 12 months starting mid-Feb 2014.

This report also includes revised figures for Year 1 of the survey, weighted based on the much more up to date market share data on which the latest figures (July-Sept 2015) are based.

The figures in this report are estimates based on a sample survey and so there is a degree of uncertainty associated with them. All tables and charts include 95% confidence intervals which reflect the uncertainty in the results. They provide a range of values within which the true value will lie 95% of the time.

More detail on methodological issues, including survey design and laboratory procedures are contained in an annex.

Key results

- The latest results show that in Jul-Sept 2015, 14.9% of chickens (skin samples) had levels of Campylobacter over 1000 cfu/g, a statistically significant reduction from 21.7% over the same period last year (Jul-Sept 2014).
- For comparing the percentage of chickens with levels of Campylobacter above 1000 cfu/g between retailers, each retailer was compared to the overall average (weighted according to market share) among all other retailers:
 - The only named retailers which had a significantly lower prevalence compared to the average among all other retailers were: Waitrose (4.1%) and Co-op (4.7%).
 - The only named retailers which had a significantly higher prevalence compared to the average among all other retailers were: Morrisons (25.7%) and Asda (23.5%).

¹ The weighting is based on market share data provided by Kantar for the 52 weeks ending 1st February 2015.

Background to the survey

Foodborne *Campylobacter* is estimated to make more than 280,000 people ill each year in the UK and is the biggest cause of food poisoning. An EFSA Opinion² stated that up to 80% of cases can be attributed to raw poultry meat and a tenfold decrease in the exposure levels from this source is likely to reduce the number of human *Campylobacter* cases by 50 to 90% across all Member States.

The Food Standards Agency (FSA) has set up a joint target with industry to reduce *Campylobacter* in chicken. The target is focussed on levels greater than 1000 colony forming units per gram (cfu/g). It is thought that chickens with this level of *Campylobacter* contamination are the most likely to infect consumers. The joint FSA-industry target is to reduce the prevalence of these most contaminated chickens (greater than 1000 cfu/g) to below 10% at the end of the slaughter process, by the end of 2015. This equates to a level of 7% at retail owing to the natural 'die-off' of *Campylobacter* through the chill chain.

Levels of contamination

The level of *Campylobacter* contamination on chicken skin is measured in terms of the number of colony forming units per gram of skin (cfu/g). Table 1 presents the levels of contamination found on chicken skin in Jul-Sept 2015, showing the proportion of chickens in various bands of contamination. Where the test of *Campylobacter* on chicken skin gives a result below 10cfu/g we are unable to conclude that any *Campylobacter* is present. So only levels of *Campylobacter* of 10g/cfu and over are detectable.

- Detectable levels of *Campylobacter* are split into three bands: '10-99 cfu/g', '100-1000 cfu/g' and 'over 1000 cfu/g'.
- The highest band (over 1000 cfu/g) is the primary focus of attention.

Table 1 – Levels of *Campylobacter* (cfu/g) on chicken skin: Jul – Sept 2015

Chicken skin	Level of <i>Campylobacter</i> contamination (cfu/g)			
	Less than 10	10-99	100-1000	Over 1000
Percentage of chickens	23.7 (20.8 - 26.7)	26.9 (23.8 - 30.0)	34.5 (31.2 - 37.9)	14.9 (12.5 - 17.4)
No. samples	257	283	343	148

95% confidence intervals are shown in brackets. These reflect the uncertainty in the given estimate and provide a range of values within which the true percentage will lie 95% of the time.

- 76.3% of skin samples were positive for *Campylobacter* and 14.9% of skin samples showed levels of *Campylobacter* over 1000 cfu/g.

² Scientific Opinion on *Campylobacter* in broiler meat production: control options and performance objectives and/or targets at different stages of the food chain: www.efsa.europa.eu/en/efsajournal/doc/2105.pdf

For measuring Campylobacter contamination on the outer packaging of chickens at retail, a swab is thoroughly run over the entire outer surface of the packaging and tested. The level of Campylobacter contamination on packaging is therefore measured in terms of the number of colony forming units per swab (cfu/swab). The levels of contamination on the outer packaging in July-Sept 2015 are presented in Table 2.

- 6.4% of packaging samples were positive for Campylobacter and 0.3% of packaging samples had a level Campylobacter above 1000 cfu/swab.

Table 2 – Levels of Campylobacter (cfu/swab) on chicken packaging: Jul – Sept 2015

Chicken packaging	Level of Campylobacter contamination (cfu/swab)			
	Less than 10	10-99	100-1000	Over 1000
Percentage of chicken packaging	93.6 (92.0 - 95.1)	5.4 (4.0 - 6.9)	0.7 (0.3 - 1.3)	0.3 (0.0 - 0.6)
No. samples	964	57	8	3

95% confidence intervals are shown in brackets. These reflect the uncertainty in the estimate and provide a range of values within which the true percentage will lie 95% of the time.

Change since last year

Three measures are used to summarise the extent of Campylobacter contamination in chickens at retail:

- The percentage of chicken skin samples positive for Campylobacter
- The percentage of skin samples with a level of Campylobacter over 1000 cfu/g
- The percentage of outer packaging samples positive for Campylobacter

Table 3 presents the latest results for the three summary measures of Campylobacter contamination in chickens at retail. It shows both the latest results (Jul-Sept 2015) as well as those for the same period last year (Jul-Sept 2014). Both sets of results are weighted using the same data on the market share of individual retailers and therefore do not take into account any changes in market share that may have occurred between the two periods.

Table 3 also includes revised overall results for Year 1 of the survey, on the same basis (reweighted based on the more up to date market share data). The use of the more up to date market share data means that these figures differ slightly from those originally published in May 2015.

- There was a statistically significant reduction in the percentage of chickens (skin samples) with levels of Campylobacter above 1000 cfu/g from 21.7% in Jul-Sept 2014 to 14.9% in Jul-Sept 2015 (see Figure 1).
- There was a statistically significant reduction in the percentage of chickens (skin samples) positive for Campylobacter from 83.4% in Jul-Sept 2014 to 76.3% in Jul-Sept 2015.

The latest results do provide some evidence of an improvement in the levels of Campylobacter on chickens at retail, with a low prevalence in Jul-Sept 2015 in comparison to the same period last year. However we cannot rule out the possibility that this apparent change is a result of short term factors. We would need to observe a lower prevalence over a sustained period before we could be more certain that a longer term improvement has occurred as a result of interventions put in place.

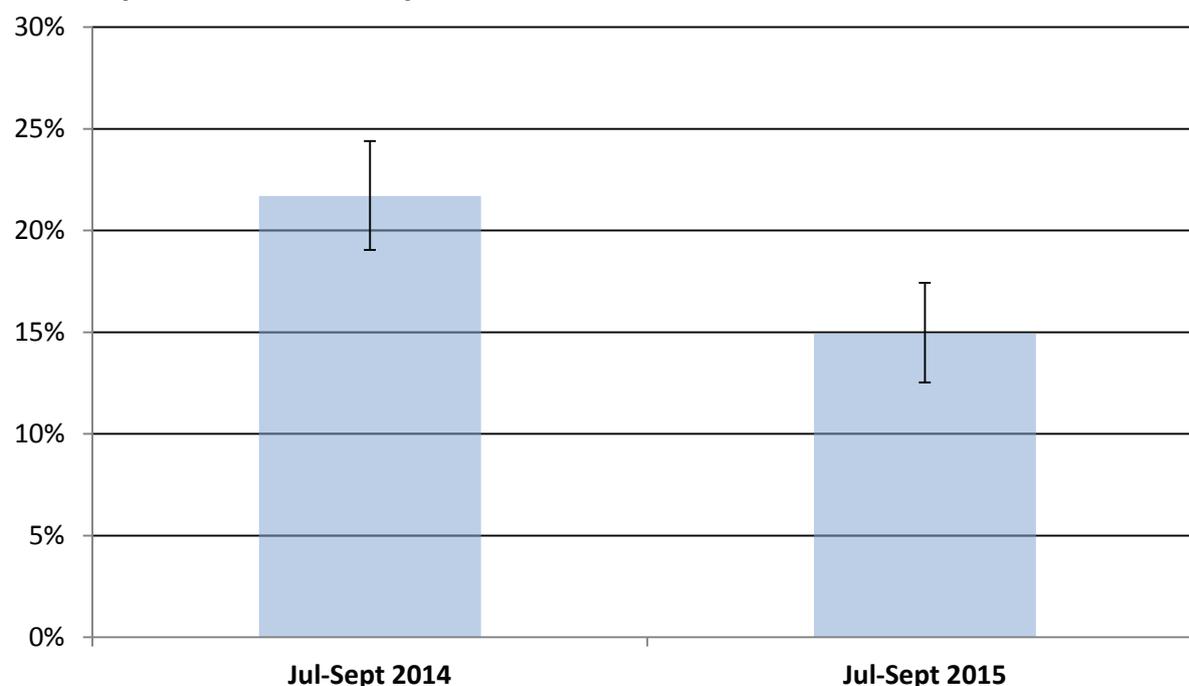
Table 3 – The overall prevalence of Campylobacter on chickens sampled and on the outside of the chicken packaging: Jul – Sept 2015, Jul – Sept 2014 and the 12 months starting mid Feb 2014 (Year 1 of the survey)

Time period	No. of samples	% skin samples positive for Campylobacter	% skin samples Over 1000 cfu/g Campylobacter	% pack samples positive for Campylobacter
Jul - Sept 15	1,032	76.3 (73.3 - 79.2)	14.9 (12.5 - 17.4)	6.4 (4.9 - 8.0)
Jul - Sept 14	1,162	83.4 (74.1 - 92.1)	21.7 (19.0 - 24.4)	8.8 (7.0 - 10.6)
Year 1 of the survey* (mid Feb 14 - mid Feb 15)	4,011	73.2 (71.7 - 74.6)	19.7 (18.3 - 21.1)	6.8 (5.9 - 7.7)

95% confidence intervals are shown in brackets. These reflect the uncertainty in the estimate and provide a range of values within which the true prevalence will lie 95% of the time.

* The results of Year 1 of the survey were originally published in May 2014. The results for Year 1 in Table 3 are revised results, with more up to date data on the market share of each retailer used to weight the data. All prevalence estimates in this table are based on the same market share data.

Figure 1 – The percentage of chickens with levels of Campylobacter over 1000 cfu/g: Jul – Sept 2014 and Jul – Sept 2015



95% confidence intervals are shown as vertical bars. These reflect the uncertainty in the estimate and provide a range of values within which the true prevalence will lie 95% of the time.

Results by retailer

Table 4 shows the latest results for the three summary measures of Campylobacter contamination in chickens at retail, by retailer. Figure 2 presents the percentage of skin samples with a level of Campylobacter over 1000 cfu/g, by retailer.

Both Table 4 and Figure 2 include 95% confidence intervals for each of the prevalence estimates (in Figure 2 these are represented as horizontal bars). Where these overlap this suggests there may be insufficient data to draw firm conclusions about which may have a lower prevalence for the given summary measure.

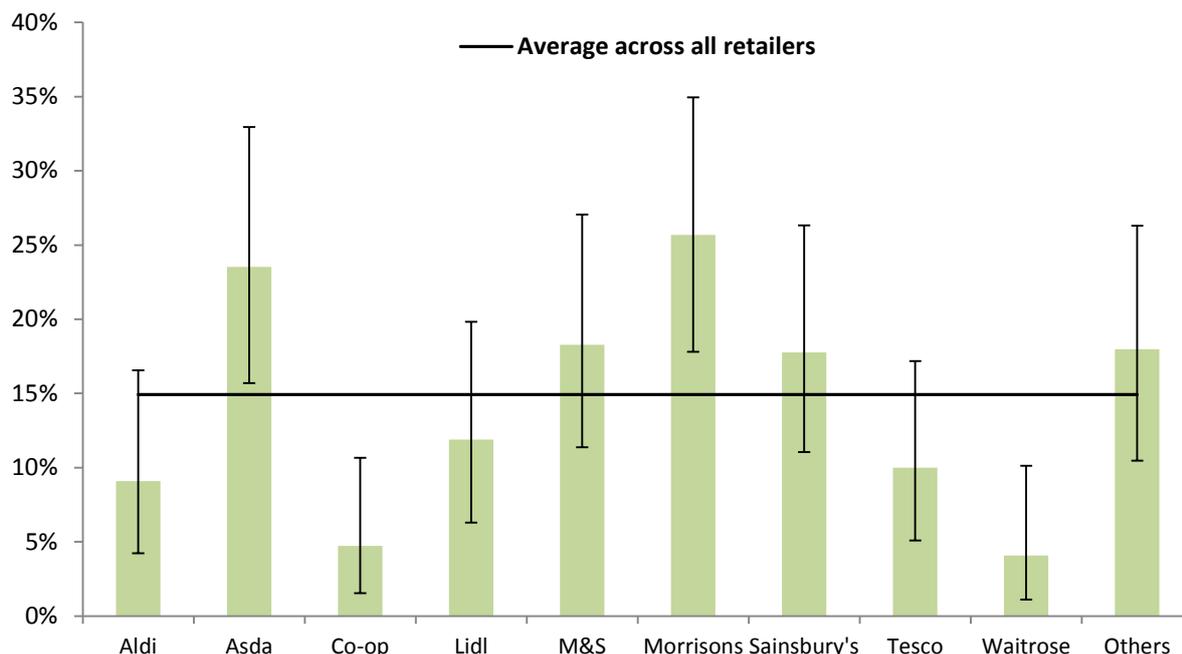
Table 4 – The overall prevalence of Campylobacter on chickens sampled and on the outside of the chicken packaging, by retailer: Jul – Sept 2015

Retailer	No. of samples	% skin samples positive for Campylobacter	% skin samples Over 1000 cfu/g Campylobacter	% packaging samples positive for Campylobacter
Aldi	99	76.8 (67.2 - 84.7)	9.1 (4.2 - 16.6)	3.0 (0.6 - 8.6)
Asda	102	76.5 (67.3 - 84.5)	23.5 (15.7 - 33.0)	8.8 (4.1 - 16.1)
Co-op	106	72.6 (62.8 - 80.7)	4.7 (1.5 - 10.7)	4.7 (1.5 - 10.7)
Lidl	101	65.3 (56.0 - 75.1)	11.9 (6.3 - 19.8)	7.9 (3.5 - 15.0)
M&S	104	82.7 (74.0 - 89.4)	18.3 (11.4 - 27.1)	1.0 (0.0 - 5.2)
Morrisons	109	86.2 (78.3 - 92.1)	25.7 (17.8 - 34.9)	14.7 (8.6 - 22.7)
Sainsbury's	108	80.4 (71.8 - 87.5)	17.8 (11.0 - 26.3)	5.6 (2.1 - 11.7)
Tesco	110	76.4 (67.3 - 83.9)	10.0 (5.1 - 17.2)	1.8 (0.2 - 6.4)
Waitrose	98	59.2 (48.6 - 68.5)	4.1 (1.1 - 10.1)	9.2 (4.3 - 16.7)
Others	95	71.6 (62.0 - 80.8)	18.0 (10.5 - 26.3)	9.6 (4.2 - 15.9)
All	1,032	76.3 (73.3 - 79.2)	14.9 (12.5 - 17.4)	6.4 (4.9 - 8.0)

95% confidence intervals are shown in brackets. These reflect the uncertainty in the estimate and provide a range of values within which the true prevalence will lie 95% of the time.

- For comparing the percentage of chickens with levels of Campylobacter above 1000 cfu between retailers, each retailer was compared to the overall average (weighted according to market share) among all other retailers:
 - The only named retailers which had a significantly lower prevalence compared to the average among all other retailers were: Waitrose (4.1%) and Co-op (4.7%).
 - The only named retailers which had a significantly higher prevalence compared to the average among all other retailers were: Morrisons (25.7%) and Asda (23.5%).

Figure 2 – The percentage of chickens with levels of Campylobacter over 1000 cfu/g by retailer: Jul – Sept 2015



Additional notes

All chickens, regardless of which retail outlet they are bought from, are at risk of being contaminated with Campylobacter, which is why it is important for consumers to handle and cook their chicken safely. Effective cooking will kill any Campylobacter on the chicken.

There are other survey variables by which results could be disaggregated, e.g. to explore possible differences associated with how close the chicken is to the use-by date or the weight of the chicken, among others. These associations are best looked at as part of a considered analysis that takes account the correlations between all the variables involved. Such an analysis will be included as part of a more in-depth report, after the full 12 months of the current survey are complete, and the raw data from the survey will also be put into the public domain. The more in-depth final report and the raw data for Year 1 of the survey can be found at:

www.food.gov.uk/science/research/foodborneillness/b15programme/b15projects/fs241044A

Methodological Annex

Eligibility criteria

Chickens eligible for inclusion in the survey are:

- Whole, chilled, raw, UK-produced standard, free range or organic chickens;
- Where contained in a package, it was unopened and undamaged;
- NOT frozen;
- NOT basted, herbed, stuffed, marinated or otherwise modified.

Samples are collected from retail premises (including both retailer own-brand and branded chickens) in the UK, and the information gathered, includes temperature on receipt, the approved premises code of the poultry plant and use-by dates.

Statistical features

This report includes prevalence estimates for the 9 retailers which have a market share greater than 4% - the 'named' retailers. All butchers and other smaller retailers are grouped together into an 'Others' category.

During the previous survey (Year 1, intended to represent the 12 month period starting mid-February 2014), chickens were sampled from retailers to reflect their market share, with a planned 4000 samples altogether. This was intended to estimate the overall mean prevalence of *Campylobacter* in fresh retail chickens in the UK over a full 12-month period.

The current survey (July 2015 – June 2016) is designed to give more robust prevalence estimates for individual named retailers, as well as to estimate the overall mean prevalence. To achieve this, a planned 400 chickens will be sampled from each of the 9 named retailers, with 200 for butchers and 200 for other smaller retailers. Adopting this design has a negligible effect on the precision of estimate for the overall mean prevalence, while resulting in better comparability between retailers. As with last year's survey, for each of the named retailers the split in terms of the types of chickens sampled (standard/ free-range/ organic) was based on the market share data.

To remove any bias from not sampling chickens according to market share, the survey data are weighted using the market share data. So the overall prevalence figures are a weighted average of the prevalence figures for each of the 9 named retailers, butchers and 'other smaller retailers'. The prevalence figures for the 'Others' category, are a weighted average of the prevalence figures for butchers and those for 'other smaller retailers'.

The market share data used were supplied by Kantar for the 52 weeks ending 1st February 2015 and are more up to date than the Kantar data used for the design of the Year 1 survey which referred to 2009/2010. As these data are a snapshot of a fixed period of time, they may not reflect the dynamic nature of the market.

These data fulfil several criteria:

- They are derived from a large UK-wide consumer panel
- They are able to provide information specifically referring to chickens at retail which meet eligibility criteria for inclusion in the survey
- They provide breakdowns by type of chicken (standard, organic, free range)

Revised overall prevalence figures for Year 1, weighted based on the new market share data, are also included in this report, and they do not differ greatly from those originally published in May 2015.

Confidence intervals, for the estimated prevalence of individual retailers are exact confidence intervals. Since the estimates of the overall prevalence, and the estimates of prevalence for the “Others” category are weighted averages, bootstrap confidence intervals are used for these estimates.

Laboratory testing

The testing laboratories were the five Public Health England (PHE) Food, Water and Environmental Microbiology Laboratories, as well as the Agri-Food Biosciences Institute (AFBI) Laboratory in Northern Ireland. Once samples reached the laboratory, testing was initiated within 24 hours, and certainly before 48 hours after sampling. Chickens were tested before or on their use-by dates. Sampling and laboratory personnel prevented cross contamination between samples and from the surrounding environment at all stages, e.g. by wearing gloves and changing them between handling each chicken, and the cleaning of equipment and work surfaces after each sample.

Two samples for each chicken were analysed; one sample consisting of 25g homogenised skin (mainly neck-skin), and one sample representing the outer packaging (prepared by examining 1mL of liquid extracted from a Maximum Recovery Diluent (MRD)-wetted sponge swab thoroughly rubbed twice over the entire outer packaging of the chicken).

The chicken samples tested were examined utilising the enumeration method based on ISO/TS 10272-2:2006 Microbiology of food and animal feeding stuffs -- Horizontal method for detection and enumeration of *Campylobacter* spp. -- Part 2: Colony-count technique. Enumeration using direct plating with a detection limit of 10 colony forming units (cfu) per gram (g) of neck-skin, or per swab sample, was used.

Any isolates of *Campylobacter* species were sent to the PHE laboratory in Colindale for further speciation.

Further information

Additional information on the survey design can be found in the original survey protocol at: www.food.gov.uk/sites/default/files/Campylobacter%20Retail%20Survey%20Year%202%20protocol%20%28final%29.pdf

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