Campylobacter in ready-to-eat foods

Full title  Campylobacter in ready-to-eat foods: the result of a fifteen-month survey

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Abstract

A fifteen-month survey of ready-to-eat foods randomly sampled at the point of sale from a range of retail and catering establishments was carried out. During this period four thousand, four hundred and sixty-nine food samples were examined for the presence of *Campylobacter* using plate-based methodology. A range of different ready-to-eat food types were examined, all of which have the potential to be contaminated with the organism. No viable *Campylobacter* were detected in any of the foods over the period of the survey. There is no evidence that the foods examined in this study represent a risk to the consumer. Although these foods may be a vehicle for infection if cross contamination occurs, other sources need to be sought as causes of enteric infection caused by this organism.
The genus *Campylobacter* is recognized as a major cause of food borne disease (2, 10). It has been estimated that in the year 2000, *Campylobacter* accounted for the largest number of indigenous cases of food borne disease, as well as the largest number of visits to doctors and hospital admissions of any food-borne disease in the United Kingdom (1). It has been estimated that in the UK eighty-six deaths were associated with food-borne disease caused by this genus during the same year, compared to sixty-seven in 1995 and fifty-nine in 1992 (1). Although the proportion of deaths associated with food-borne *Campylobacter* is relatively low compared to other organisms such as *Listeria monocytogenes*, *E.coli* 0157 and *Salmonella*, the actual numbers involved are still very significant (1).

In the country of Wales, a part of the United Kingdom with a population of approximately three million, the number of laboratory reports of *Campylobacter* for the period 1993-2001 remained constant, with a mean of 115 cases and a range of 104-131 cases per 100,000 population (4). Not all cases in Wales will have necessarily been food-borne, as *Campylobacter* infection can also occur through consumption of contaminated water and contact with pets or livestock (2, 9), but it is assumed that a large proportion were food borne. In the same period, laboratory reports of *Salmonella* (including *Sal.enteritidis* and *Sal.typhimurium*) in Wales decreased by 62% from 64 to 24 cases per 100,000 population (5) and notified cases of general food poisoning decreased from 206 cases per 100,000 population in 1995 to 157 cases per 100,000 population in 2001, a decrease of 24% (6). This latter total includes notified cases of *Campylobacter*, reflecting the fact that whilst other notified cases of food poisoning are declining, the proportion of *Campylobacter* in Wales is increasing and this organism is therefore becoming an increasingly important problem.
for both the public and organizations involved in maintaining and improving public health.

The Public Health Laboratory Service in Wales (PHLS in Wales) is a regional group of the Public Health Laboratory Service (PHLS), which includes a publicly funded network of public health microbiology laboratories throughout England and Wales. The laboratories of the PHLS in Wales that examine food have representation on a body called the Welsh Food Microbiological Forum (WFMF), which also has representation from Welsh Local Authority Environmental Health Departments, the Food Standards Agency Wales, Communicable Disease Surveillance Center (CDSC) Wales and academia. The primary function of the WFMF is to co-ordinate and organize a sampling programme, in which the same range of ready-to-eat foods (described as the shopping basket) is randomly sampled from the point of sale by all participating Local Authorities (11). For the examination of the foods in the shopping basket, the same laboratory methods are used and the same range of organisms is tested for, currently including aerobic colony count, Enterobacteriaceae, coliforms, *Escherichia coli*, *Listeria*, *Bacillus*, *Salmonella* and *Staphylococcus aureus*. The range of foods and organisms is reviewed on an annual basis and changes are made based upon the advice of WFMF members, epidemiological data and scientific evidence.

In 2000, it was agreed by the WFMF to introduce *Campylobacter* into the range of organisms to be tested for, in response to a need to identify sources of the organism in ready-to-eat foods available to consumers in Wales. Testing for *Campylobacter* was carried out for fifteen months and ceased at the end of December 2001.
Materials and Methods

**Sample and premises selection.** The criteria for sample selection were that foods had to be ready-to-eat and sampled from the point of sale and that premises had to be randomly selected to avoid sampling bias. The sampling period was October 2000-December 2001. Random selection of premises was ensured by individual Local Authority sampling officers using a common method, agreed by the members of the WFMF, based upon random number selection. Food types sampled included cooked meats, cooked poultry, sandwiches (various fillings), sauces, desserts and ice creams, pate, rice, and pasta based salads, fresh fruit, fresh herbs and pizzas.

**Method for Campylobacter examination.** The method used followed the PHLS Standard Methods for Food Products: Detection of Campylobacter species (Standard method F21). An aliquot of 25g of food sample was homogenized in 225ml Campylobacter enrichment broth (Oxoid, Basingstoke, U.K.) for 30 seconds. The homogenate was incubated for 24 hours (+/-6 hours) at 37°C (+/-1°C), followed by incubation at 41.5°C (+/-1°C) for 24 hours (+/-6 hours). A loopful of enrichment broth was sub-cultured onto CCDA plates (Oxoid, Basingstoke, U.K.) and incubated in a gas jar at 37°C (+/-1°C) for 48 hours (+/-6 hours) in a microaerophilic atmosphere created by using a CampyGen gas sachet (Oxoid, Basingstoke, U.K.). Plates were examined for typical Campylobacter colonies and confirmation was by oxidase test (Oxichrome reagent, supplied by ProLab Diagnostics, Neston, U.K.), ability to grow only under microaerophilic conditions when sub-cultured to blood agar (Oxoid, Basingstoke, U.K.) and incubated under microaerophilic and aerobic conditions for 48 hours at 37°C and determination of cell morphology using phase-contrast microscopy. Internal quality control for this method indicated a lower detection limit of four
colony forming units in 25g of spiked food samples. As part of the laboratory accreditation requirements, monthly spiked samples were examined using the above method.
Results and discussion

Four thousand, four hundred and sixty-nine samples were submitted for examination by PHLS in Wales food laboratories. A total of 3812 (85%) samples from retailers and 657 (15%) samples from restaurants were examined. None of the samples contained viable, detectable Campylobacter using enrichment and plate-based methodology. The analysis of results by food category is presented in Figure 1. This figure is based upon the food categories used in the PHLS guidelines for ready-to-eat foods sampled at the point of sale (7). The sampling programme included foods generally associated with a higher risk of Campylobacter infection, such as poultry, meat and eggs (2, 9), and those foods specifically highlighted in recent UK studies, which included chicken served in restaurants (3, 10).

There is no evidence from this study to suggest that the specific food products tested and premises sampled were acting as a source of Campylobacter for consumers in Wales. Further sources of Campylobacter in Wales need to be explored, since the number of cases notified to CDSC Wales has remained constant over the last nine years, including the period of the survey (4). Pets, livestock or contaminated water have all been identified as sources of Campylobacter (2, 9), although an estimated 80% of indigenous cases of Campylobacter in the U.K. in 1995 were food-borne (1). It is possible that some other commercially available ready-to-eat foods, either not included in the shopping basket or produced and sold from premises not selected during the randomized programme, may provide sources of the organism. However, this source is less likely than other potential sources, such as consumption of undercooked meat and poultry within the domestic environment, which is very likely to be a source of the organism. Furthermore, cross contamination of ready-to-eat
foods (such as those examined in this study) cannot be ruled out. To illustrate this latter point, several surveys have reported a high percentage of raw chicken contaminated with *Campylobacter* (8, 12) and an on-going survey of retail raw chickens available to Welsh consumers by this laboratory currently has a positive rate for *Campylobacter* of 71%. With such a relatively high positive rate, it can be seen how contamination could easily be spread within the domestic environment through poor handling and lack of personal hygiene.

In conclusion, the results of the study suggest that ready-to-eat foods supplied by retailers are associated with a very low rate of contamination with *Campylobacter*. Other sources of this organism are likely to be more important in the occurrence of enteric infection caused by this organism.
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References


Figure Legends

Figure 1 Breakdown of samples by food category
Figures

Fig 1

![Bar chart showing the number of samples for different food categories. The x-axis represents different food categories: Meat, Dessert, Savoury, Fruit & Vegetables, Ready to eat meals, Sandwiches, Seafood, Dairy. The y-axis represents the number of samples. The chart shows that the highest number of samples is for Meat, followed by Sandwiches.](image-url)