

Campylobacteriosis in New Zealand

Part two – tackling the problem

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In terms of the Campylobacter in Poultry Risk Management Strategy (CRMS), the best place to start tackling the problem through the food chain was on the farm. An observational survey was therefore undertaken in 2007 to identify the main risk factors for on-farm contamination of poultry flocks in New Zealand.

Information collected by veterinarians during on-farm visits to 60 broilers farms was then compared to industry guidance to identify areas for improvement. While biosecurity practices were reported to be good, a number of recommendations were made:

- More rigorous monitoring of chlorination of drinking water.
- More rigorous cleaning of drinker lines.
- Universal provision of hand washing/hand hygiene facilities.
- Repairs/replacement of sheds to improve cleanliness.
- Universal cleaning and sanitising between flocks.
- More universal availability of facilities for vehicle decontamination.

Fig. 1. Reduction of *C. jejuni* on skin-on broiler meat portions domestically frozen and stored at -18°C for up to 10 weeks.

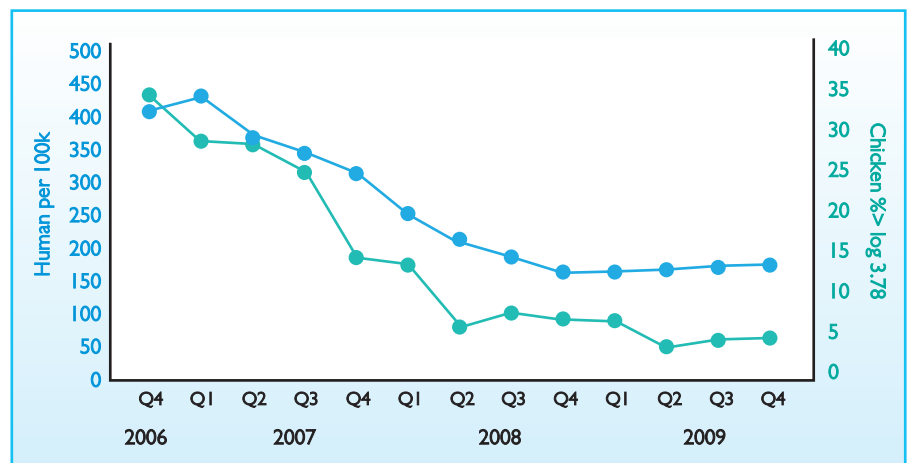
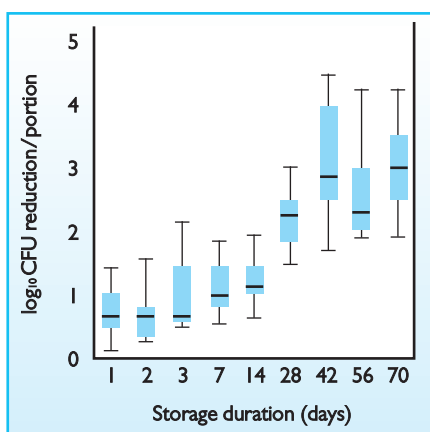


Fig. 2. Rates of campylobacteriosis in relation to reductions in campylobacter carriage by broiler carcasses.

The provision of dedicated clothing for each shed was also recommended and was backed up scientifically by a study that detected campylobacter in loose debris shaken from poultry farm overalls, which could potentially transfer the pathogen from one shed to another.

How much of a reduction in flock contamination could be achieved by the other measures listed would require coordinated testing in relation to practices to determine their impact.

Practices regarding litter disposal and thinning of broiler flocks, also acknowledged to be potential contributors to campylobacter contamination on-farm, were not considered by industry to be realistic or practical targets and, to date, these have not been investigated further.

Despite strict biosecurity measures and the increasing potential for the use of on-farm interventions such as vaccination, competitive exclusion or bacteriophages therapy in the future, there are no currently recognised key interventions available for commercial use during primary production to significantly reduce campylobacter.

After many trials the poultry industry concluded that practical enhancements of the on-farm biosecurity systems that had been so effective in controlling salmonella were not going to provide the level of control needed for campylobacter.

Given the difficulty in eradicating this

pathogen from the production environment, campylobacter on retail broiler chicken meat is still likely to occur, particularly in certain sites such as the carcass cavity and on wing portions which have been shown to harbour more campylobacter than other sites. Improved good hygienic practice during processing and campylobacter reduction interventions at key processing steps are currently the most important in the New Zealand situation for reducing campylobacter counts and minimising contamination in retail product.

Consumer attitudes

Consumer attitudes regarding campylobacter interventions were sought through a consumer survey conducted to investigate consumer practices, attitudes and opinions in relation to campylobacter and poultry.

Interestingly, despite the increased media coverage of campylobacter in New Zealand at the time, consumers were still more likely to identify salmonella as a chicken-associated hazard.

Results related to purchase and freezing of poultry revealed that 63% of New Zealand consumers buy mostly raw poultry (versus 28% frozen) but 51% would freeze either all or some of this purchased poultry in domestic freezers. The most common frozen stor-

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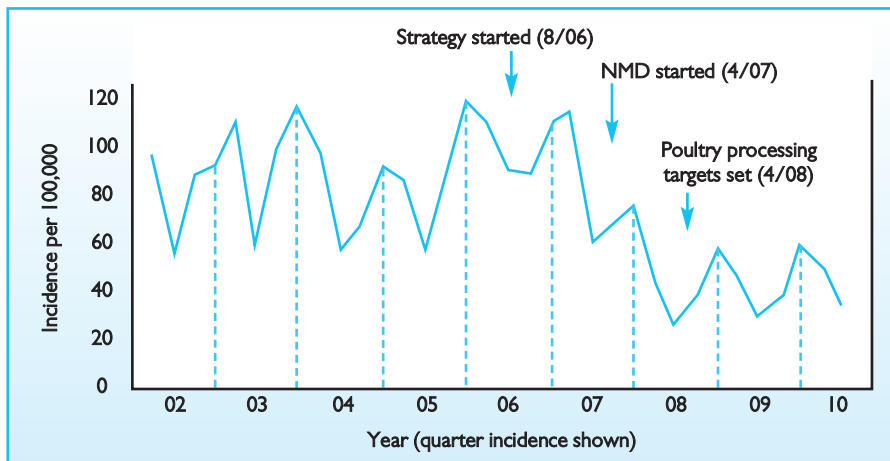


Fig. 3 Trends in incidence of human campylobacteriosis per quarter in New Zealand in relation to the CRMS.

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age period reported was 2-4 weeks (64% response), with a further 12% of consumers storing poultry for 1-6 months. The survey also identified an increase in refrigerated thawing (up from 26% in a previous survey to 40%).

Pros and cons of freezing

In relation to interventions to improve the safety of poultry, over 50% of consumers surveyed said they would much rather purchase either frozen chicken or chicken from farms with stricter farm management practices, than purchase fresh chicken that was irradiated, or chemically treated.

Freezing of poultry has a number of pros and cons. The pros include the clear evidence that both domestic and commercial freezing can reduce campylobacter by 1 to 2 \log_{10} CFU after one week's storage (Fig. 1).

The cons include the storage time required to get significant and reliable reductions (greater than 4-6 weeks for a 3 \log_{10} CFU reduction; Fig. 1), major financial consequences for industry, problems with storage of frozen product at both the processor and retail levels, and additional food safety concerns related to thawing.

The industry understandably did not want to freeze product and so they trialled many possible intervention measures in processing as an alternative to this, identifying a hierarchy of effectiveness as follows:

- By far the most effective measure is the effective maintenance and accurate adjustment of evisceration equipment. Experience has also shown that if the equipment is more than 8-10 years old then serious consideration should be given to replacement.
- The correct operation of an immersion chilling system with controls around loading, water flow rates, chlorine (permitted and used in most countries outside of the EU) and pH will give a minimum \log_{10} reduction of 2.5. In the most modern installations this figure is higher.
- The use of other interventions, such as acidified sodium chlorite (ASC), will give a

further 1.5 \log_{10} reduction, though in those processing plants that have this facility it is more commonly used to extend shelf life than for campylobacter control. Chlorine, ASC and other potential antimicrobials are considered processing aids and are not declarable on the final packaging in New Zealand and Australia.

Further measures were however needed when progress to reduce the number of human cases of campylobacteriosis was not going well in 2007. Rather than a NZFSA proposal mandating interventions at key processing steps, the industry suggested that a target count on broiler carcasses would be a more workable option.

They proposed a level that would be both achievable (at a significant cost) and that both parties believed would have a favourable public health impact. NZFSA modified the proposal and mandated it as the Campylobacter Performance Target (CPT) in early 2008 as part of the National Microbiological Database (NMD) implementation with limits applying to high counts, carcass rinse at end of primary processing and industry quarterly median.

The CPT is complex but for the purposes of Fig. 2, a maximum of 13% are allowed to exceed 3.78 \log_{10} CFU per broiler carcass.

There is no doubt that this mandated approach resulted in a significant reduction in the quantity of campylobacter contaminating broiler chicken meat in New Zealand and influenced a dramatic decrease in human case numbers. Nevertheless, as industry points out despite the positive public health outcome, trying to reduce the prevalence of positive birds is extremely difficult, while reduction in the number of bacteria on the carcass is difficult but possible.

Since the introduction of the target the poultry industry has continued on-farm research including an unsuccessful competitive exclusion trial with AgResearch, a longitudinal project looking at birds and possible vectors through the life of a flock, and a fly exclusion project. Whilst these are not all completed yet it is obvious that multiple infection opportunities exist, based on changes in the predominant MLST types

over time. An alternative explanation could be that different strains are promoted based on changes to the gastrointestinal tract, diet and the first thinning operation. The industry has also improved processing by better understanding the mechanics of the evisceration process and the location of washing steps. So, nearly five years later, following the implementation of the strategy and two further updates including the introduction of NMD testing and the setting of the CPT, the impact has been substantial (Fig. 3).

When compared with 2006 data, human case numbers declined by almost 20% in 2007 and 58% by the end of 2008. Cases increased slightly in 2009, but this still represents a >50% reduction versus 2006 data (all cases of human campylobacteriosis).

In relation to the goal of decreasing the number of human foodborne illness cases by 50% over five years, NZFSA is close to achieving this with the 2009 data showing 88.9/100,000 head of population (goal is <80.95/100,000 by 2013) after two years under the CRMS.

However, it remains to be seen whether this reduction can be improved upon. The current CRMS 2010-2013 allows for some significant follow up work to assist this process, namely the review of the campylobacter performance target, and consideration of the contribution of other sources of campylobacter besides broiler chicken.

Furthermore, the NMD and human case figures for campylobacteriosis will continue to provide real time feedback on strategy performance.

Teamwork essential

For the CRMS to be a success, teamwork was essential. Regulators working closely with the poultry industry was a given and continues to be high priority. While it could be argued that it is slightly easier to accomplish in a country with a modest population (~4.3 million people) and only three major poultry suppliers, regardless, bringing together the relevant people in an atmosphere of collaboration is no mean feat and this has been another one of the key successes of the strategy to date (apart from the drop in campylobacteriosis cases). This article also bears testament to the prevailing collaborative ethos.

Although much has been done and achieved, the rate of human illness in New Zealand due to campylobacter is still very high by international standards (provisionally 175 cases per 100,000). The proportion of current illness related to the handling and consumption of poultry is not clear and at this stage it is difficult for the industry to see where further improvements could be made. Nevertheless, both NZFSA and industry are committed to the joint approach to this problem, the partnership has worked well to date and it is expected that it will continue to do so.

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