

This is provisional English translation of an excerpt from the original full report.

Risk Assessment Report

Campylobacter jejuni and *Campylobacter coli* in chicken (Microorganisms and viruses)

Food Safety Commission of Japan (FSCJ)
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ABSTRACT

FSCJ conducted self-tasking risk assessment on *Campylobacter jejuni* and *Campylobacter coli* in chicken. The objective of the risk assessment was to quantify the risk posed by this particular food-pathogen combination, and to estimate the effectiveness of possible risk reduction measures against the risk. The risk assessment addresses *Campylobacter* food poisoning cases and its complications principally characterized by gastrointestinal symptoms associated with consumption of chicken meat prepared and consumed at home and/or restaurant, among the whole population of Japan.

Initially factors associated with *Campylobacter* food poisoning such as pathogens, hosts and causal foods were identified from relevant data sources, then probability of events were evaluated at different stages of the food chain (farm-to-fork). The risk assessment analysed effectiveness of risk reduction measures taken at different stages, upon quantified risks as well as ultimate incidence of the food poisoning. Considered risk reduction measures were: (i) reduction of on-farm contamination; (ii) strategic slaughtering (strict separation of contaminated and non-contaminated chicken herds at poultry slaughter plants); (iii) strict control of chlorine concentration in chilling water at poultry slaughter plants; (iv) reduction of raw poultry consumption; (v) reduction of insufficient cooking; and (vi) reduction of cross-contamination from chicken to ready-to-eat (RTE) foods via cooking utensils and hands.

Quantitative risk assessment methods were used to estimate the current risk and the effects of the listed six risk reduction measures. Exposure assessments were carried out using mathematical modelling of contamination rates and contamination levels in chicken at the following four stages, namely, farms; slaughter/meat processing; distribution/retail; and preparation/ consumption. A dose-response curve describing the relationship between the number of bacteria and probabilities of *Campylobacter* infection was drawn as a model to assess health effects of the hazard. In risk characterization, probabilities of the infection were simulated, and the effectiveness of the six risk reduction measures was estimated under scenarios assumed with different levels of food safety parameters.

The result of the risk assessment suggested that the average infection rate with *Campylobacter* associated with consumption of chicken among those who eat raw poultry meat at home was 1.97% per

meal, and 5.36% among those who eat raw poultry meat at restaurants. The rates for those who do not eat raw chicken were 0.20% and 0.07% at home and restaurants, respectively. It was also found that the average number of infection was 3.42 times per person per year for those who eat raw chicken and 0.364 times for those who do not eat raw chicken. An average of 150,000,000 persons was estimated to be infected with *Campylobacter* annually, of which 80% shared by those who eat raw chicken.

The risk assessment did not investigate into possible difference in incidence by severity of symptoms. However, the main symptoms of *Campylobacter* infection seen in about 80% of the patients are diarrhea, abdominal pain, and fever, which would usually be relieved within 5 days, and fatal cases are extremely rare. The assessment did not identify high risk groups for *Campylobacter* infection as well. Although *Campylobacter* infection is supposed to cause Guillain-Barré Syndrome (GBS), the pathogenesis has not been fully elucidated either.

The effectiveness of each of the six risk reduction measures was calculated as a binomial variable, resulting in the fact that the two measures i.e. the strategic slaughtering processing and the strict control of chlorine level in chilling water were proved to have considerably high impacts upon reduction of the number of *Campylobacter* infection, at its rate of 44.0% and 21.4%, respectively.

Among the other four measures, risk reduction rate generated by reduced raw poultry meat consumption was significantly high. The reduction of *Campylobacter* infection rate was 69.6% when the raw consumption was reduced by 80%. The risk reduction rate by control of on-farm contamination was also suggested to be highly effective when both strategic processing and provision of chlorine control were employed.