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Research Note

Low Prevalence and Concentrations of *Campylobacter* Detected on Retail Chicken Breasts

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ABSTRACT

Since 2014, *Campylobacter* has been the leading bacterial cause of foodborne illness in the United States, resulting in millions in economic losses each year and strains on public health. Chicken, the most consumed meat in the US, is the primary source of *Campylobacter* infection in humans, accounting for 50 – 90% of all cases. To survive food processing stressors like oxidative and cold stress, *Campylobacter* enters a viable but nonculturable (VBNC) state, where cells remain intact (viable) but cannot grow in conventional culture media within the prescribed time (nonculturable). This presents a food safety challenge since growth in selective media, which only determines the culturable cells, is required for the detection of *Campylobacter* using standard microbiological methods. Culture-independent detection methods like viability quantitative polymerase chain reaction (qPCR) have been developed to overcome this challenge and detect both culturable and nonculturable viable cells. Here, we applied both culture-based methods and viability qPCR to assess the occurrence and levels of *Campylobacter* on 209 retail skinless boneless chicken breasts processed in at least eight U.S. states. Culture-based enrichment yielded isolates for 15 samples, with whole genome sequencing identifying isolates from four samples as *C. jejuni*, eight samples as *Acinetobacter* spp., one as *Micrococcus luteus*, and one as *Escherichia coli*, resulting in a 1.9% prevalence of *Campylobacter* on retail skinless boneless chicken breast. Spread plating on selective media and viability qPCR did not detect *Campylobacter* in any of the tested samples, suggesting that concentrations were below the limit of detection of these methods.

Campylobacteriosis is the most frequently reported bacterial foodborne illness in humans, caused by *Campylobacter* (Shah, 2024). The Centers for Disease Control and Prevention (CDC) estimates that approximately 1.5 million people in the United States (US) become ill from a *Campylobacter* infection annually (CDC, 2025). Human campylobacteriosis typically presents with diarrhea, abdominal cramping and pain, and fever (El-Saadony et al., 2023), and in some cases, can lead to severe postinfection complications such as pancreatitis, reactive arthritis, and Guillain-Barré syndrome, the latter of which can be fatal (Ruiz-Palacios, 2007).

Campylobacter is a Gram-negative, microaerophilic, and thermophilic bacterium that colonizes the chicken gastrointestinal tract. It is primarily associated with raw or undercooked poultry and spreads rapidly within flocks via fecal contamination, particularly when fecal concentrations reach high levels of 10^6 to 10^{10} CFU/g (Battersby et al., 2016; Berndtson et al., 1996; Rudi et al., 2004). *Campylobacter* is frequently detected on retail chicken meat, with reported prevalence as high as 76% in some studies (Guyard-Nicodème et al., 2015). A recent dose–response modeling study showed that ingestion of just 10 CFU *Campylobacter* in liquid food corresponds to a 100% predicted probability of infection, while approximately 1,000 CFU were required to reach the same probability in young adults consuming solid foods (Abe et al., 2021). Given the high prevalence and low infectious dose of *Campylobacter* (Abe et al., 2021), quantitative detection in poultry meat is important to improve risk assessment and inform pathogen control strategies to reduce consumer exposure.

Current *Campylobacter* monitoring methods for poultry are primarily culture-based and qualitative, providing no data on contamination levels. Furthermore, these methods may underestimate prevalence due to their inability to detect viable but nonculturable (VBNC) cells. This physiological state is marked by reduced metabolic activity, enhanced stress tolerance, and loss of culturability on standard microbiological

Abbreviations: VBNC, viable but nonculturable; PMA, propidium monoazide; IAC, internal amplification control; ST, sequence type.

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