Determination of Detection Limits of a Commercial RT-PCR for *Campylobacter jejuni* in Poultry Rinsates

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Why is a Limits Method Needed in the Industry?

Campylobacter jejuni is a foodborne pathogen associated with the consumption of undercooked poultry. The European Union allows poultry carcasses to possess <3.00 Log_{10}CFU/g of *Campylobacter*. Therefore, a rapid and accurate *C. jejuni* limits method is critical to improve current surveillance technologies.

Aim

The purpose of this study was to determine enrichment parameters on the limit of detection (LOD) for *C. jejuni* in poultry rinsate samples using the BAX® Q7 RT-PCR System.

Method

Bulk post-chill poultry rinsates (N=32; 30 mL) were aliquoted to 24 oz. Whirl-Pak bags inoculated at a targeted 0.00, 1.00 and 2.00 Log_{10}CFU/mL of *C. jejuni* (n= 5 samples/inoculation level; 1 non-inoculated sample/enrichment time). Subsequently, 30 mL of pre-warmed (42˚C) 2X Blood-Free Bolton's Broth with 2X Supplement was added to each sample and incubated at 42˚C for 16h and 18h. At each enrichment time, samples were removed from the incubator and run on the BAX® Q7 system with 8 technical replicates per sample at each timepoint. Detection differences between enrichment times and inoculation levels were explored using chi-square and Mann-Whitney U test in R 4.0.5 ($P \leq 0.05$).

Results

The inoculation levels were determined to be 0.58, 1.58, and 2.58 Log_{10}CFU/mL. After 16h of enrichment, *C. jejuni* was detected at 18, 70, and 100% among rinsates inoculated at 0.58, 1.58, and 2.58 Log_{10}CFU/mL of *C. jejuni*, respectively. After 18h of enrichment, the detectable percentages increased to 73, 100, and 100% for each inoculation level. There was a difference in detectable *C. jejuni* between different enrichment times ($P < 0.05$). Furthermore, there was a difference in detection between inoculation levels 0.58 and 1.58 at 18 hours ($P < 0.05$).

Significance

Currently, FSIS uses enrichment for *Campylobacter* spp. detection with the 3M MDS system at 1 CFU/sample. The results suggest the BAX® System provides the industry with a faster validation method for *C. jejuni* samples with a limit of detection of 1.58 Log_{10}CFU/mL. More research is warranted to establish a CampyLimits™ of 10 CFU/mL.

Table 1. Prevalence: Percentage of *C. jejuni* detected using the BAX® Real-Time PCR after incubation

% Positive at Each Time Point and Log CFU/mL		
Log CFU/mL	16 h	18 h
0.58	18%	73%
1.58	70%	100%
2.58	100%	100%

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