

A quantitative prevalence of *Escherichia coli* O157 in different food samples using real-time qPCR method

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Abstract

Escherichia coli serogroup O157 is the main causative agent of several intestinal and extra-intestinal foodborne diseases in humans through consumption of low-dose contaminated foods such as milk, beef, and vegetables. To date, studies regarding the quantitative prevalence of *E. coli* O157 in foods are so limited. Therefore, this study aimed to evaluate the quantitative prevalence rate of *E. coli* serogroup O157 in raw milk ($n = 144$), vegetable salad ($n = 174$), and minced beef samples ($n = 108$) using the real-time qPCR SYBR green melting curve method targeting the *rfaA* gene. First, we evaluated the method and found a sensitive and specific qPCR assay with 1 log of CFU/ml detection limit to detect *E. coli* O157 ($T_m = 80.3 \pm 0.1^\circ\text{C}$). About 2.77%, 10.18%, and 9.19% of raw milk, minced beef, and vegetable salad samples, respectively, were contaminated with *E. coli* O157. Minced beef and vegetable salad samples were significantly more contaminated than raw milk samples. Population average of *E. coli* O157 in raw milk, minced beef, and vegetable salad samples were 2.22 ± 0.57 , 3.30 ± 0.40 , and 1.65 ± 0.44 log CFU/ml or gr, respectively. Significantly higher levels of population of *E. coli* O157 were observed in minced beef samples. Minced beef can be regarded as the main food in the transmission of this foodborne pathogen. Routine quantitative rapid monitoring is strongly suggested to be carried out to prevent foodborne diseases caused by *E. coli* O157.

KEYWORDS

E. coli O157, food samples, qPCR, quantitative prevalence

1 | INTRODUCTION

Foodborne or waterborne disease occurs when a foodborne or waterborne pathogen is ingested with food or water and establishes itself in the human or animal host. It may also occur when a toxigenic foodborne or waterborne pathogen establishes itself in a food or water supply and produces different intestinal and extra-intestinal

toxins which are ingested (Todd, 2020). More than 250 different foodborne hazards have been recognized (Hoffmann & Scallan, 2017). Notably, most severe foodborne cases occur in the very old, the very young, pregnant, and immune compromised individuals (Braden & Tauxe, 2013). Food borne diseases are a great threat to public health and be regarded as the main concern and challenge in food industry, health, hand safety (Devleeschauwer et al., 2018). More than 76

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