

Risk of *Escherichia coli* O157:H7 infection linked to the consumption of beef

ABSTRACT

Escherichia coli O157:H7 is a major food-borne pathogen that has resulted in numerous outbreaks around the world. Widespread distribution of the organism in various ecological niches impedes the control measures. This study aimed to detect and quantify *E. coli* O157:H7 in beef sold in wet markets and hypermarkets in Malaysia and to determine the risk of *E. coli* O157:H7 infection linked to consumption of beef. The *rfb* O157 and *flicH7* primers targeted on somatic antigen (O157) and flagellar antigen (H7) respectively of *E. coli* O157:H7 was used for the MPN-PCR method. A total of 99 beef samples were collected from local wet markets and hypermarkets. The highest *E. coli* O157:H7 contamination rate was observed in beef samples collected from wet markets (89.50%), whereas the contamination rate in hyper market A and B were comparatively low (35.35 and 20% respectively). However, the microbial load was highest in the beef samples from hypermarket A (1100 MPN/g) while *E. coli* O157:H7 bacterial load in beef samples from hypermarket B and wet market ranged from 3 to 93 MPN/g and 3 to 240 MPN/g, respectively. Using the Quantitative Microbial Risk Assessment (QMRA) approach the risk was estimated incorporating the findings of the prevalence study and predictions based on home storage, cooking and consumption patterns. Three different exposure pathways were investigated to estimate the risk associated with contaminated beef and Monte Carlo simulation was used to determine the level of uncertainty. The developed model predicated that consumption of contaminated beef can be accountable for 1.83E+06 *E. coli* O157:H7 cases per year in Malaysia. The reliability of the model, data gaps and further research needs, is discussed. Through continuous improvement Quantitative Microbial Risk Assessment provides valuable insight into controlling and prevention strategies.

Keywords: *E. coli* O157:H7; Beef; Quantitative microbial risk assessment