NOVEL PCR-BASED RAPID DETECTION STRATEGIES FOR *ESCHERICHIA COLI* O157:H7 AND *SALMONELLA* IN MEAT PRODUCTS

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ABSTRACT

Accurate and fast detection methods for foodborne pathogens from various food samples have always been important goals for scientists from many research areas. DNA-based PCR techniques cannot differentiate between DNA from live and dead cells. Ethidium bromide monoazide (EMA) is a dye that can bind to DNA of dead cells and prevent its amplification by PCR. An EMA staining step prior to real-time PCR allows for the effective inhibition of DNA contamination from dead cells. With an optimized EMA staining step, the detection range was 10^3 to 10^9 CFU/ml for pure cultures, 10^5 to 10^9 CFU/ml for artificially contaminated poultry samples, and 10^8 to 10^4 CFU/g for ground beef samples. After a 12-h enrichment step, EMA combined real-time PCR could detect as low as 10 CFU/ml *Salmonella* from poultry products, as well as 10 CFU/g *E. coli* O157:H7 from ground beef. Quantum dots (QDs) are a family of nanosized particles with a 1 to 10 nm in radius. It has long-term stable photostability, high quantum yield, broad absorption spectra, narrow emission spectra and high signal-to-noise ratio. In this study, bead free QD facilitated detection method was used to detect *Salmonella* and *E. coli* O157:H7 cells from pure cultures, it can detect as low as 10 CFU/ml cells. When it was applied to artificially contaminated ground beef, it can detect 10^6 CFU/g cells. After enrichment, it can detect as low as 10 CFU/g *Salmonella* cells from ground beef.