Public Abstract

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Graduation Term:FS 2009

Department:Food Science

Degree:PhD

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

Accurate and fast detection methods for foodborne pathogens from various food samples have always been important goals for scientists from many research areas. Cultural-based detection method takes at least four days to complete. With the use of TaqManÂ® probes, the real-time PCR technique is a rapid and sensitive way to detect foodborne pathogens. However, DNA-based PCR techniques cannot differentiate between DNA from live and dead cells, while RNA-based PCR can. 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 of a subsequent real-time PCR 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. These detection ranges proved that EMA real-time PCR has better detection efficiency than RT-real-time PCR. After a 12-h enrichment step, EMA combined real-time PCR (EMA real-time PCR) could detect as low as 10 CFU/ml Salmonella from chicken rinses and egg broths, as well as 10 CFU/g E. coli O157:H7 from ground beef. The use of EMA real time PCR can successfully prevent false positive results from dead cells and represent a simple, yet accurate detection tool for enhancing the safety of food. 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. QD has been used in cell detection, imaging and DNA hybridization. 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. Further studies which can improve the detection range and specificity will be worth to try.