Optimisation of the PCR-*invA* primers for the detection of *Salmonella* in drinking and surface waters following a pre-cultivation step

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Abstract

A polymerase chain reaction (PCR)-based method for the detection of *Salmonella* species in water samples was optimised and evaluated for speed, specificity and sensitivity. Optimisation of Mg^{2+} and primer concentrations and cycling parameters increased the sensitivity and limit of detection of PCR to 2.6 x 10^4 cfu/mℓ. A 6h non-selective pre-enrichment step further increased the limit of detection to 26 cfu/mℓ. Out of 14 different *Salmonella* strains tested, only two, *Salmonella arizonae* and *Salmonella pullorum*, did not give positive amplification results with primers homologous to a conserved region of the *invA* gene. When environmental and drinking waters were assessed, a non-selective pre-enrichment step was included to increase the detection efficiency of PCR. The PCR method demonstrated specificity in the presence of other competing micro-organisms as confirmed by the conventional culture method. No false positives or negatives were observed when household and environmental water samples were tested by *invA*-PCR analysis parallel to the culture method.

Keywords: water quality, *Salmonella*, PCR, invA primers