Detection of Salmonella in Meat: Comparative and Interlaboratory Validation of a Noncomplex and Cost-Effective Pre-PCR Protocol

Cost-effective and rapid monitoring of Salmonella in the meat production chain can contribute to food safety. The objective of this study was to validate an easy-to-use pre-PCR sample preparation method based on a simple boiling protocol for screening of Salmonella in meat and carcass swab samples using a real-time PCR method. The protocol included incubation in buffered peptone water, centrifugation of an aliquot, and a boiling procedure. The validation study included comparative and interlaboratory trials recommended by the Nordic Organization for Validation of Alternative Microbiological Methods (NordVal). The comparative trial was performed against a reference method (NMKL 187, 2007) and a PCR method previously approved by NordVal with a semiautomated magnetic bead-based DNA extraction step using 122 artificially contaminated samples. The LOD was found to be 3.0, 3.2, and 3.4 CFU/sample for the boiling, magnetic bead-based, and NMKL 187 methods, respectively. When comparing the boiling method with the magnetic beads, the relative accuracy (AC), relative sensitivity (SE), and relative specificity (SP) were 98, 102, and 98%, respectively (Cohen's kappa index 0.95). When comparing results obtained by the boiling to the culture-based method, the AC, SE, and SP were found to be 98, 102, and 98%, respectively (kappa index 0.93). In the interlaboratory trial including valid results from 11 laboratories, apart from two false-positive samples by the boiling method combined with PCR, no deviating results were obtained (SP, SE, and AC were 100, 95, and 97%, respectively). This test is under implementation by the Danish meat industry, and can be useful for screening of large number of samples in the meat production, especially for fast release of minced meat with a short shelf life.