Overview

Purpose: To validate the Thermo Scientific™ SureTect™ Salmonella species Assay according to AOAC Research Institute (RI) Performance Tested Methods™ validation criteria.

Methods: The SureTect method was compared to the reference method detailed in ISO 6579:2002.

Results: The SureTect Salmonella species assay reliably detected the presence of Salmonella in a wide variety of matrices.

Introduction

The Thermo Scientific SureTect Salmonella species Assay (PT0100A) is a new Real-Time PCR test for the detection of Salmonella from food, animal feeds and environmental samples, which combines pre-dispensed lysis reagent and lyophilised, tabletted PCR reagents to simplify and improve assay handling, along with dedicated software to run the assays as well as interpret and display PCR results. This study was conducted using the AOAC RI Performance Tested Methods™ program to validate the SureTect Salmonella species assay in comparison to the reference method detailed in ISO 6579:2002 with a variety of food matrices.

FIGURE 1. The Thermo Scientific SureTect System.

Methods

Sample Preparation

Bulk samples of foods were screened for natural contamination with Salmonella before splitting into three samples: unspiked (control), low spiked (0.2-2 CFU/25g) and high spiked (2.5 CFU/25g) samples. Once spiked, all samples were allowed to equilibrate as per AOAC instructions.

Surface samples of stainless steel were spiked with a suspension of Salmonella. Where samples were not paired as in the case of surface samples and raw ground beef analysis with the 8th enrichment protocol, additional separate samples were prepared.

SureTect Assay Method

25g samples of foods and surface sponges were added to 225ml of room temperature Buffered Peptone Water (BPW) (ISO), with the exception of raw ground beef with the short 8th protocol, where pre-warmed BPW (ISO) was used. Samples of raw ground beef analysed with the short protocol were incubated at 41.5°C for 8h, non-fat dried milk, environmental samples, raw beef and liquid egg were incubated at 37°C for 18h and cooked shrimps, Frankfurters, lettuce and raw chicken for 20h at 37°C.

Following enrichment 10µl of each sample was added to the prefilter SureTect Lysis Tubes (prepared by additionally adding Protease K Reagent) and the sample lysed according to the SureTect lysis protocol (37°C for 10 minutes followed by 95°C for 5 minutes).

Results

Inclusivity and exclusivity

All 117 Salmonella isolates were detected as positive by the SureTect Software. None of the 36 exclusivity isolates were detected by the SureTect Software.

FIGURE 3. Inclusivity of the SureTect Salmonella species Assay.

Once lysed, 20µl of the lysate was added to the SureTect PCR Tubes, which contain lyophilised PCR reagents before running on the Thermo Scientific™ PikoReal™ Real-Time PCR instrument. Assay results were automatically interpreted as “positive” or “negative” by the SureTect Software.

All SureTect results were confirmed culturally using the SureTect confirmation method of direct plating onto Oxoid™ Brilliance™ Salmonella Agar and confirming presumptive positive purple colonies with the Oxoid™ Salmonella Latex Kit (DR1108A) and additionally using the reference method confirmation protocol.

ISO Reference Method

The reference method detailed in ISO 6579:2002 was followed, using Brilliance Salmonella Agar as the second plating medium. Confirmations were performed using the Remel® microID™ kit or bioMérieux® API® 20E kit, Triple Sugar Iron (TSI) slants and poly-O and poly-H antisera.

Inclusivity

One hundred and seventeen Salmonella isolates covering a wide variety of O- serogroups and subspecies were cultured in BPW (ISO) and analysed at a level of approximately 10³CFU/ml using the SureTect assay protocol according to AOAC-RI PTM requirements.

Exclusivity

Thirty-six exclusivity isolates were cultured in TSB for 18-24 hours and analysed at a level of approximately 10³CFU/ml using the SureTect assay protocol according to AOAC-RI PTM requirements.

FIGURE 2. SureTect Assay Workflow.

Food Matrix Analysis

No statistically significant difference, by probability of detection analysis (POD), was seen for any of the ten food matrices and the environmental surface evaluated in this PTM study during either the method developer or independent laboratory studies between the ISO reference method or the SureTect Salmonella species assay.

FIGURE 4. Independent Laboratory Results for the ISO and SureTect Salmonella species Methods.

Conclusion

The SureTect Salmonella species Assay was shown to be an accurate and user-friendly method, due to the use of pre-dispensed lysis reagent, tabletted PCR reagents and automatic interpretation of results. Results from a wide range of foods, including challenging matrices, demonstrated the assay was able to reliably detect the presence of Salmonella.

References