RAPID DETECTION OF LISTERIA IN RAW AND PROCESSED AQUATIC FOOD PRODUCTS USING ACTERO™ LISTERIA ENRICHMENT MEDIA

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INTRODUCTION

Listeria is a ubiquitous organism and can be isolated from a variety of sources such as soil, surface water, plants, and raw foods. Among the foods, fish and seafood products are not the most likely sources of Listeriola (1), however with the increasing consumption of seafood products, the prevalence has increased in the recent years (2). Thus, it has become more and important to perform microbiological testing to control the presence of Listeria. Therefore, to help prevent foodborne outbreaks, it is of paramount importance for the food industry to have access to effective and reliable detection tools. The use of an enrichment medium specifically developed for the recovery and growth of sub-lethally injured Listeria in combination with a good detection methodology is certainly one of the key elements of a successful/safe food strategy.

The goal of this study is focused on the application of Actero™ Listeria Enrichment Media (Actero™ Listeria) for a single-step recovery of Listeria in raw and processed aquatic products followed by real-time PCR detection.

MATERIALS AND METHODS

Method Comparison Study

Frozen cooked shrimp (25 g) was inoculated using heat-stressed Listeria. Cold smoked salmon (25 g) and raw frozen salmon (25 g) were contaminated using unstressed Listeria inoculum. Frozen cooked shrimp and raw frozen salmon were then equilibrated at least 2 weeks at 20°C, whereas inoculated cold smoked salmon was stabilized for 48-72 h at 2-8°C (Table 1). For each food matrix, low level and high level inoculum replicates as well as control samples were enriched in 100-150 ml of Actero™ Listeria at 35°C for 18 or 22 h (Table 2) and then analyzed using the hygiena® BAX® System Real Time PCR Assay for L. monocytogenes and Genus Listeria in comparison with the US FDA method (3).

Probability of detection (POD) statistical model was used to evaluate the differences between the alternative and the reference method.

Table 2. Enrichment Conditions

<table>
<thead>
<tr>
<th>Study</th>
<th>Food Matrix</th>
<th>Sample Size</th>
<th>Temperature</th>
<th>Time</th>
<th>Medium Volume</th>
<th>Sample Dilution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frozen cooked shrimp</td>
<td>25 g</td>
<td>35°C</td>
<td>22 hours</td>
<td>150 ml</td>
<td>1:1</td>
<td></td>
</tr>
<tr>
<td>Cold smoked salmon</td>
<td>25 g</td>
<td>15°C</td>
<td>24 hours</td>
<td>100 ml</td>
<td>1:1</td>
<td></td>
</tr>
<tr>
<td>Raw frozen salmon</td>
<td>25 g</td>
<td>20°C</td>
<td>18 hours</td>
<td>100 ml</td>
<td>1:1</td>
<td></td>
</tr>
</tbody>
</table>

RESULTS AND DISCUSSION

Based on the POD analysis (Fig. 1), no significant difference was observed between the Actero™ Listeria protocol and the reference method protocol for the detection of Listeria in frozen cooked shrimp, cold smoked salmon and raw frozen salmon. No false positives and only one false negative outcome were observed among 180 samples tested (Table 3).

Results from the method verification study demonstrate the reliability of the methodology as the results from the alternative method are identical to the reference method when different levels of Listeria contamination are applied to different food matrices (Table 4).

CONCLUSIONS

- Single step enrichment using Actero™ Listeria media can significantly reduce the time necessary for the successful detection of Listeria.
- The BAX® System combined with the Actero™ Listeria enrichment methodology showed high performance and reliability for the detection of Listeria from raw and processed aquatic food products.