Compatibility of Hygiena's BAX® System and the 3M™ Environmental Scrub Sampler for the Detection of *Salmonella* and *Listeria* from Stainless Steel and Plastic Surfaces

hygiena®

One Health Diagnostics™

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BAX® System Q7 BAX® System X5 foodproof® microproof®

INTRODUCTION:

Organisms such as *Listeria* and *Salmonella* thrive in food processing facilities due to their ability to attach and persist on various surfaces for many years, which leaves food vulnerable to cross contamination. These characteristics has made it crucial for food manufacturers to have a properly designed environmental monitoring program (EMP) that can detect and eliminate potential pathogens.

There are many sample collection devices and transport broths available for environmental monitoring of foodborne pathogens. Choosing one that will neutralize a wide range of biocides and disinfectants used during sanitization without affecting pathogen growth and subsequent downstream detection methods must be considered for an effective environmental monitoring program.

PURPOSE:

This study was designed to evaluate the compatibility of the BAX System Real-Time and Standard PCR assays and the 3M Environmental Scrub Sampler with a Wide Spectrum Neutralizer for the detection of *Salmonella* and *Listeria* from environmental surfaces.

METHODS:

In two separate studies, stainless steel and plastic surfaces were inoculated with *Salmonella* Typhimurium or *Listeria monocytogenes*, respectively, and a competitor organism. Each method under evaluation consisted of 20 low-level samples, 5 high-level samples, and 5 uninoculated controls. The inoculum was desiccated for 24 hours before swabbing.

For the BAX method, samples were collected using the 3M Environmental Scrub Samplers hydrated in 10 mL of Wide Spectrum Neutralizer. For the reference method, samples were collected using sponges hydrated in 10 mL of D/E Neutralizing broth. After 2 hours, sponges were enriched, tested and confirmed according to each target analytes method of analysis (Figure 1 & 2).

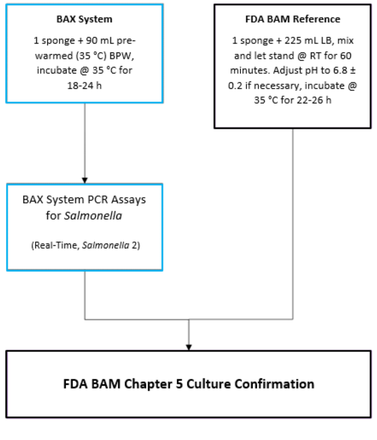

Figure 1: *Salmonella* Testing – Unpaired Validation

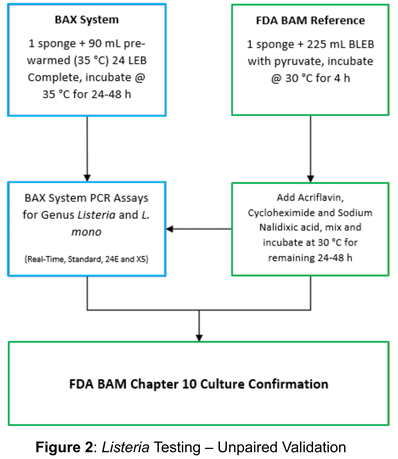

Figure 2: *Listeria* Testing – Unpaired Validation

RESULTS:

Salmonella BPW enrichments and *Listeria* 24 LEB Complete enrichments displayed no false positives or false positives as all PCR results were in complete agreement with culture (Table 1).

Probability of detection (POD)
To compare the test and the reference method, no significant differences were observed for the low inoculated *Salmonella* and *Listeria*, and the high inoculated *Listeria*. A significant difference was observed for high inoculated *Salmonella*, where the test method achieved a higher proportion of positives (Table 1).

Matrix	Strain	CFU/Test Area	N	Presumptive BAX Results	Confirmed BAX Results	Reference Method	$dPOD_C$ (BAX vs Ref)	95% CI
Stainless (4" x 4")	*S.* Typhimurium DD13557 *E. faecalis* DD10565	0/87.2	5	0	0	0	0.00	-0.45, 0.45
		7.4/87.2	20	16	16	11	0.25	-0.04, 0.49
		74/872	5	5	5	2	0.60	0.03, 0.88
Plastic (4" x 4")	*L. mono* DD605 *C. braakii* DD13471	0/132.5	5	0	0	0	0.00	-0.45, 0.45
		12.5/132.5	20	18	18	17	0.05	-0.17, 0.27
		125/1325	5	5	5	5	0.00	-0.43, 0.43

CFU/Test Area = Target inoculation/Competitor inoculation, N = Number of test portions, $dPOD_C$ = Difference between the BAX System method confirmed and Reference POD values, 95% CI = If the confidence interval of dPOD does not contain zero, then the difference is statistically significant at the 5% level

SIGNIFICANCE:

Results from both studies demonstrated statistically equivalent or superior performance of PCR compared to the appropriate reference method, validating the suitability of the BAX System to be used with the 3M environmental scrub sampler hydrated with a wide spectrum neutralizer to accurately detect *Salmonella* and *Listeria*.

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