

Recovering *Listeria* from yields equivalent results from 12”x12” vs 4”x4” surface areas with the InSite™ *Listeria* Species test

Introduction

The potential for *Listeria* cross contamination from the production environment into products is monitored by testing surfaces, including product contact surfaces, floors, and drains after cleaning. More testing in more areas provides greater assurance and control over facility cleanliness. An efficient screening method giving presumptive positive results can support more effective surveillance and estimation of risk.

Hygiena scientists evaluated the performance of the Hygiena InSite™ *Listeria* Species tests for recovering *Listeria* from 12” x 12” and 4” x 4” environmental surfaces. The *Listeria* Species test contains a chromogenic liquid media specific to *Listeria* bacteria, providing easy-to-read results in 24-48 hours. In this study, stainless steel and plastic surfaces were artificially inoculated with *L. monocytogenes*, then tested using the InSite *Listeria* species test swabs.

The results of this study demonstrate that recovery of *Listeria* from plastic or stainless steel surfaces are equivalent regardless of the size of the surface sampled.

Sample Preparation and Testing

L. monocytogenes was selected to artificially inoculate stainless steel and plastic surfaces. Ten stainless steel and 10 plastic surfaces were inoculated with less than 10 CFU to serve as fractionally spiked samples. Surfaces were swabbed five times horizontally and five times vertically before incubating the swabs at 37°C for 48 hours. After swabbing each surface, devices were activated by breaking the snap valve and squeezing the bulb expelling the broth down into the tube. Devices were incubated at 37°C for 48 hours, and the result recorded. All samples were confirmed with the reference culture method.

Results and Discussion

The results for recovery of *Listeria* from stainless and plastic surface areas are summarized in Table 1. For stainless steel surface samples, InSite *Listeria* species test swabs returned six positives when swabbing 4”x4” surfaces and five positives when swabbing 12”x12” surfaces. For plastic surface samples, InSite *Listeria* species test swabs returned seven positives each from swabbing 4”x4” surfaces and 12”x12” surfaces. All presumptive results from InSite *Listeria* species test swabs corresponded with the confirmation results from the reference culture method.

Table 1. *Listeria* recovery from stainless and plastic surfaces using the Hygiena InSite *Listeria* species test swabs

Sample	Strain	Surface area	Presumptive positive	Culture positive
Stainless Steel	<i>L. monocytogenes</i>	4"x4"	6	6
		12"x12"	5	5
Plastic	<i>L. monocytogenes</i>	4"x4"	7	7
		12"x12"	7	7

Probability of detection (POD) was used as a statistical metric to summarize the results of this study in table 2. Recovering *Listeria* from 4"x4" or 12"x12" stainless steel surface areas showed no statistically significant difference. Likewise, recovering *Listeria* from 4"x4" or 12"x12" plastic surface areas showed no statistically significant difference. The differences between inoculation and presumptive/culture positive results also were not statistically significant.

Table 2. Statistical significance of 4x4 vs 12x12 inch surface testing.

Sample Type	Inoculation CFU/swab	4"x4" Surface			12"x12" Surface			dPOD ^c	95% CI ^d
		Positive tests	POD ^a	95% CI	Positive tests	POD ^b	95% CI		
Stainless Steel	6	6	0.6	(0.31, 0.83)	5	0.5	(0.24, 0.76)	0.1	(-0.29, 0.45)
Plastic	6	7	0.7	(0.40, 0.89)	7	0.7	(0.40, 0.89)	0	(-0.36, 0.36)

^aPOD = Number of confirmed results from 4"x4" positive results divided by total samples

^bPOD = Number of confirmed results from 12"x12" positive results divided by total of samples

^cdPOD = Difference in recovery between 4"x4" and 12"x12" surface POD values

^d95% CI = If the confidence interval of a dPOD does not contain zero, then the difference is statistically significant at the 5% level

Conclusions

The results of this study demonstrate that with proper swabbing technique the recovery of *Listeria* from stainless steel or plastic is equivalent regardless of surface area sampled using the Hygiena *Listeria* species test swabs.