



Detection of *Salmonella* and *Listeria* in Large Test Portions of Mexican Style Cheeses using Hygiena’s BAX® System

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INTRODUCTION:

Most Mexican style cheeses are fresh with little to no ripening and thus have a soft texture with a high-moisture content. These characteristics make Mexican-style cheeses particularly vulnerable to pathogen contamination¹. Previous outbreaks of foodborne illness have been caused by *Salmonella* and *Listeria monocytogenes*. As the consumption of these cheeses gain popularity and the demand increases, food safety strategies in the manufacturing process must be implemented to prevent potential outbreaks.

PURPOSE:

The purpose of this study was to assess the performance of the BAX® System method in comparison to the FDA BAM reference method for the detection of *Salmonella* and *Listeria* in separate matrix studies for two Mexican style cheeses.

REGISTERED TRADEMARKS:

BAX® is a registered trademark of Hygiena for its line of equipment, reagents and software used to analyze samples for microbial contamination.

BAX® System Q7

BAX® System X5

foodproof®

microproof®

METHODS:

Two matrix validations for queso fresco and two matrix verifications for queso blanco were prepared by inoculating each product separately with *Salmonella* or *Listeria monocytogenes*. Queso fresco was inoculated at two levels of contamination: a low level expected to produce fractional positive results, and a high level expected to produce all positive results, while queso blanco was inoculated at a low level only. All samples were then equilibrated at 4 °C for 48-72 hours before enrichment.

Following an unpaired study design, test portions for *Salmonella* (375 g) and *L. mono* (125 g) were enriched 1:10 in BPW and 24 LEB Complete, respectively, for the BAX System method. Samples were analyzed with real-time PCR before culture confirmation. Reference method samples were enriched and confirmed according to the procedures in the FDA BAM for each organism.

SIGNIFICANCE:



The results of these studies demonstrate that the BAX System method is specific, sensitive, and accurate for the detection of *Salmonella* and *Listeria* in queso fresco and queso blanco. Furthermore, when compared to the reference method results were statistically equivalent or superior.

RESULTS:

Salmonella (Table 1)

- For queso fresco and queso blanco enriched in BPW, real-time PCR returned results with 100% agreement to culture.
- Probability of detection (POD)
 - Queso fresco – compared to the reference method, there was a significant statistical difference for the low level with the BAX System recovering significantly more positives.
 - Queso blanco – compared to the reference method, there are no significant statistical differences.

Listeria (Table 2)

- For queso fresco and queso blanco enriched in 24 LEB Complete, real-time PCR returned results with 100% agreement to culture.
- Probability of detection (POD)
 - Queso fresco – compared to the reference method, there are no significant statistical differences.
 - Queso blanco – compared to the reference method, there was a significant statistical difference with the BAX System recovering significantly more positives.

DATA:

Table 1. BAX System Method vs. Reference Method Results for *Salmonella*

Sample Type	Target Strain	MPN/Test Portion	N	BAX System Method	Reference Method	dPOD _c	95% CI
Queso Fresco	S. Newport DD1261	0.45	20	17/17	6	0.55	0.25, 0.73
		5	5	5/5	5	0	-0.43, 0.43
Queso Blanco	S. Typhimurium DD1467	0.4	6	1/1	2	-0.17	-0.57, 0.12

Table 2. BAX System Method vs. Reference Method Results for *Listeria*

Sample Type	Target Strain	MPN/Test Portion	N	BAX System Method	Reference Method	dPOD _c	95% CI
Queso Fresco	<i>L. mono</i> DD6891	1.7	20	14/14	17	-0.15	-0.39, 0.11
		17	5	5/5	5	0	-0.43, 0.43
Queso Blanco	<i>L. mono</i> DD605	0.4	6	2/2	0	0.33	0.09, 0.70

MPN/test portion = Most Probable Number is based on the POD of reference method test portions, N = Number of test portions, BAX System Method = Presumptive positive results/confirmed positive results for the test method enrichment, Reference Method = confirmed positive results for the reference enrichments, dPOD_c = Difference between the BAX System method and reference method POD values, 95% CI = If the confidence interval of dPOD does not contain zero, then the difference is statistically significant at the 5% level

REFERENCES:

- Ibarra-Sanchez, L.A., Van Tassell, M.L., and Miller, M.J. (2017). Invited review: Hispanic-style cheeses and their association with *Listeria monocytogenes*. *Journal of Dairy Science*. 100(4),2421-2432. <https://doi.org/10.3168/jds.2016-12116>