

Quantitation, Detection, and Differentiation of *Salmonella* from Poultry

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Introduction

Salmonella contamination in poultry can pose significant health risks to consumers, therefore rigorous testing protocols are required to ensure safe consumption¹. Thermo Fisher Scientific offers a range of PCR methods to enable fast and accurate quantitation, detection and differentiation of *Salmonella* from poultry samples (Figure 1).

Figure 1. Representative Poultry Samples



The study objective was to harmonize test portion dilution and enrichment for raw poultry products and poultry rinses using the Thermo Scientific™ PCR assays in Table 1.

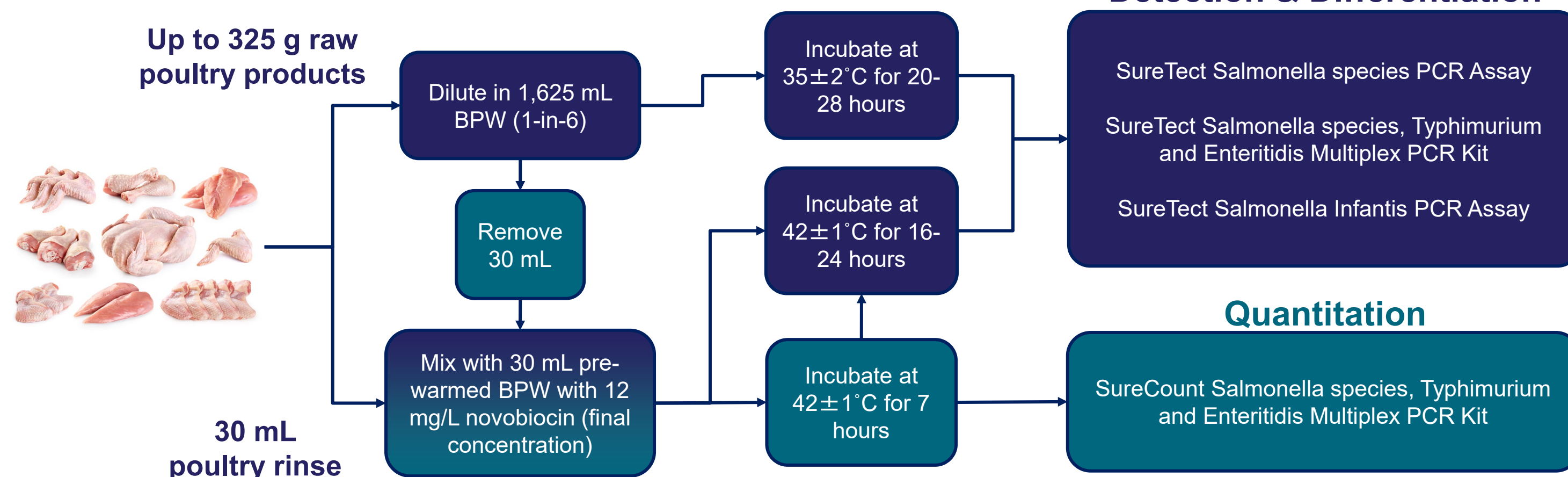
Table 1. Thermo Scientific PCR Assays Tested in Study

Assay Name	Assay Features
Thermo Scientific™ SureCount™ Salmonella species, Typhimurium and Enteritidis Multiplex PCR Kit (SureCount)	Quantitation
Thermo Scientific™ SureTect™ Salmonella species PCR Assay (SureTect Salmonella species)	Detection
Thermo Scientific™ SureTect™ Salmonella species, Typhimurium and Enteritidis Multiplex PCR Kit (SureTect Salmonella Multiplex)	Detection & Differentiation
Thermo Scientific™ SureTect™ Salmonella Infantis PCR Assay (SureTect Salmonella Infantis)	Detection & Differentiation

Methods

Matrix studies were conducted according to AOAC Appendix J² guidelines comparing performance of Thermo Scientific PCR methods to the USDA FSIS MLG 4.14³ with Appendix 2.05⁴ reference methods for the isolation, identification, and quantitation of *Salmonella*. The PCR analysis was conducted on the Applied Biosystems™ QuantStudio™ 5 Real-Time Food Safety PCR Instrument and the Applied Biosystems™ 7500 Fast Real-Time PCR Instrument. Harmonized enrichment protocols were followed across all Thermo Scientific PCR methods allowing for quantitation, detection and differentiation from a single test portion (Figure 2). Additional enrichment protocols were tested during the study and can be accessed by scanning the [QR-code](#).

Figure 2. Harmonized Poultry Testing Protocols



Results

For quantitation, the SureCount method had a statistically comparable performance to the reference method and met AOAC performance requirements. For detection, the SureTect Salmonella species, SureTect Salmonella Multiplex, and SureTect Salmonella Infantis methods all had a statistically comparable performance to the reference method and met AOAC performance requirements (Table 2).

Table 2. Raw Poultry Product & Poultry Rinse Study Results

Matrix	Detection & Differentiation						Quantitation				
	Assays	SureTect Salmonella species	SureTect Salmonella Multiplex			SureTect Salmonella Infantis	SureCount Salmonella Multiplex	Contamination level			
			Salmonella spp.	S. Enteritidis	S. Typhimurium			Salmonella spp.	S. Infantis	Low	Medium
Raw poultry products (325 g) Paired	Fractional level dPOD	0.00	0.00		0.00	0.00	Difference of Means	-0.24	0.09 ^a	0.23	
	Confidence Intervals (95%)	-0.13, 0.13	-0.27, 0.27		-0.13, 0.13	-0.26, 0.26		Confidence Intervals (95%)	-0.82, 0.33	-0.11, 0.29	-0.10, 0.55
	Acceptance	PASS						Acceptance	PASS		
Poultry rinses (30 mL) Unpaired	Fractional level dPOD	-0.15		-0.15	-0.15	-0.05	Difference of Means	0.49	0.20	-0.36 ^b	
	Confidence Intervals (95%)	-0.41, 0.15		-0.40, 0.13	-0.41, 0.15	-0.31, 0.22		Confidence Intervals (95%)	0.23, 0.76	-0.17, 0.57	-0.84, 0.13
	Acceptance	PASS						Acceptance	PASS		

A. Difference in probability of detection (dPOD) for Thermo Scientific PCR methods and reference method. All results met AOAC performance requirements.

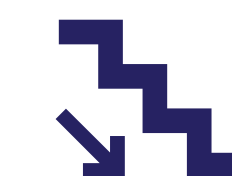
B. Difference of means for SureCount method and reference method. All results met AOAC performance requirements. ^aMedium inoculation level was co-infected with *S. Enteritidis* and *S. Typhimurium* for raw poultry products, ^bHigh inoculation level was co-infected with *S. Typhimurium* and *S. Hadar* for poultry rinses.

Conclusions

The Thermo Scientific PCR methods for *Salmonella* testing in poultry offer end-users the ability to quantitate, detect, and differentiate *Salmonella* from a single test portion, accurately and reliably supporting timely decision making. The simple and user-friendly workflows and data interpreting software enhance the user's experience.



Harmonized protocols for quantitation, detection, and differentiation



Reduced testing resource and time to result



Guaranteed accuracy and reliability through certified workflows

References

- Shaji S, Selvaraj RK, Shanmugasundaram R. Salmonella Infection in Poultry: A Review on the Pathogen and Control Strategies. *Microorganisms*. 2023 Nov 20;11(11):2814. doi: 10.3390/microorganisms11112814. PMID: 38004824; PMCID: PMC10672927. (Accessed May 2024)
- Official Methods of Analysis of AOAC INTERNATIONAL. (2019) 21st Ed., Appendix J: AOAC INTERNATIONAL Methods Committee Guidelines for Validation of Microbiological Methods for Food and Environmental Surfaces, AOAC INTERNATIONAL, Gaithersburg, MD
- U.S. Department of Agriculture (USDA) Food Safety and Inspection Service (FSIS) MLG 4.14 – Isolation and Identification of *Salmonella* from meat, poultry, pasteurized egg, siluriformes (fish) products and carcass and environmental sponges. MLG 4.14 Isolation and Identification of *Salmonella* from Meat, Poultry, Pasteurized Egg, Siluriformes (Fish) Products and Carcass and Environmental Sponges (usda.gov) (Accessed March 2024)
- U.S. Department of Agriculture Food Safety and Inspection Service Microbiology Laboratory Guidebook Appendix 2.05 Most Probable Number Procedure and Tables (MPN).

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