

Interim Report: VARB Request Fa23-SC-01

South Carolina Resubmersion Project

Introduction

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FDA Technical Assistance/Research Provided

Experimental Design and Methods

This study is being performed to generate baseline *Vibrio* data for South Carolina during *Vibrio* control months (VCMs) (May – September). Current practice is a 14-day resubmersion period following desiccation before harvest, if more specific data are not available. This study was designed to assess resubmersion periods across South Carolina at three sites using floating cages. Oysters were acclimated for two weeks at each site prior to the start of each trial.

Two trials were conducted at Barrier Island and Lady's Island sites in South Carolina. A third site was planned, but data generation was not possible due to field conditions and shipping constraints. During each trial, triplicate samples of 15 triploid oysters were collected from control and overnight desiccated cages at the following time points: immediately post-desiccation (D0), seven days (D7) after resubmersion, nine days (D9) after resubmersion, and 14 days (D14) after resubmersion.

Samples were collected by South Carolina Department of Natural Resources, South Carolina Sea Grant, and local farmers. After collection, samples were dipped in an ice slurry for 1-2 minutes. Samples were then packed into insulated shipping containers and shipped overnight to the FDA Gulf Coast Seafood Laboratory (GCSL). Upon arrival at GCSL, samples were analyzed for total (*tlh*) and pathogenic (*tdh*, *trh*) *V. parahaemolyticus* and for *V. vulnificus* (*vvh*) using the most probable number (MPN)-Real-time polymerase chain reaction (PCR) as previously described (National Shellfish Sanitation Program (NSSP) Guide for the Control of Molluscan Shellfish: 2023 Revision). MPN estimates were calculated following the Bacteriological Analytical Manual (BAM) Appendix 2.

Results

Table 1. Air temperature, water temperature, and salinity at the time of each sample collection at Barrier Island site.

Barrier Island					
Trial	Trial Dates	Time Point	Air Temp. (°C)	Water Temp. (°C)	Salinity (ppt)
1	7/22/2024 - 8/5/2024	D0	27.2	29.9	32.6
		D7	26.1	29.1	29.9
		D9	27.2	29.6	30.9
		D14	25.0	29.4	31.9
2	8/20/2024 - 9/3/2024	D0	27.2	28.9	29.6
		D7	26.1	28.1	26.1
		D9	27.7	29.5	25.8
		D14	23.3	28.7	29.4

Table 2. Air temperature, water temperature, and salinity at the time of each sample collection at Lady's Island site.

Lady's Island					
Trial	Trial Dates	Time Point	Air Temp. (°C)	Water Temp. (°C)	Salinity (ppt)
1	7/22/2024 - 8/5/2024	D0	27.8	29.6	19.8
		D7	23.9	28.0	27.6
		D9	25.0	29.7	28.2
		D14	24.4	28.4	20.6
2	8/12/2024 - 8/26/2024	D0	26.1	28.3	NA*
		D7	26.1	28.0	12.6
		D9	26.1	27.6	12.5
		D14	23.3	25.7	11.5

*data not provided on collection form

Table 3. Abundances (mean log MPN/g and standard deviation) of *Vibrio* spp. in oysters at Barrier Island site.

Barrier Island									
Sample Information				Mean Log MPN/g (Standard Deviation)					
Trial	Trial Dates	Time Point	Treatment	tlh*	tdh**	trh‡	vwh‡‡		
1	7/22/2024 -8/5/2024	D0	Control	1.66 (0.30)	0.05 (0.54)	0.05 (0.54)	0.02 (0.58)		
			Desiccated	4.52 (0.31)	2.13 (0.62)	2.17 (0.56)	2.19 (0.69)		
		D7	Control	1.99 (0.37)	-0.36 (0.50)	-0.36 (0.50)	0.56 (0.51)		
			Desiccated	2.48 (0.26)	-0.82 (0.00)	-0.72 (0.17)	1.49 (1.02)		
		D9	Control	1.86 (0.32)	-0.03 (0.68)	-0.03 (0.68)	0.03 (0.12)		
			Desiccated	2.02 (0.59)	0.23 (0.38)	0.23 (0.38)	0.21 (0.37)		
		D14	Control	2.16 (0.94)	-0.72 (0.17)	-0.82 (0.00)	0.73 (1.14)		
			Desiccated	1.97 (0.33)	-0.04 (0.40)	-0.17 (0.24)	0.99 (0.86)		
		2	8/20/2024 -9/3/2024	D0	Control	2.97 (0.34)	0.20 (0.42)	0.35 (0.49)	2.83 (0.48)
					Desiccated	4.58 (0.34)	1.61 (0.32)	2.37 (0.53)	3.97 (0.00)
				D7	Control	3.11 (0.24)	0.10 (0.23)	0.88 (0.67)	2.26 (0.34)
					Desiccated	2.77 (0.34)	0.58 (0.09)	0.58 (0.09)	2.13 (0.43)
D9	Control			2.77 (0.34)	-0.10 (0.31)	0.16 (0.73)	1.96 (0.38)		
	Desiccated			2.80 (0.52)	0.70 (0.59)	0.79 (0.53)	2.44 (0.50)		
D14	Control			2.66 (0.30)	0.00 (0.16)	0.71 (0.14)	1.88 (0.43)		
	Desiccated			2.66 (0.30)	-0.04 (0.40)	0.54 (0.16)	1.54 (0.28)		

*tlh is the gene marker for total *V. parahaemolyticus*

**tdh is a gene marker for pathogenic *V. parahaemolyticus*

‡trh is a gene marker for pathogenic *V. parahaemolyticus*

‡‡vwh is the gene marker for *V. vulnificus*

Instances where replicates were below the limit of detection (LOD; 0.3 MPN/g), half the LOD (0.15) was substituted before log transforming and averaging.

Table 4. Abundances (mean log MPN/g and standard deviation) of *Vibrio* spp. in oysters at Lady's Island site.

Lady's Island							
Sample Information				Mean Log MPN/g (Standard Deviation)			
Trial	Trial Dates	Time Point	Treatment	tlh*	tdh**	trh‡	vh‡‡
1	7/22/2024 - 8/5/2024	D0	Control	3.01 (0.53) ●	0.84 (0.68) ●	0.84 (0.68) ●	2.48 (0.22) ●
			Desiccated	5.24 (0.24)	1.75 (0.19)	1.75 (0.19)	3.66 (0.30)
		D7	Control	2.71 (0.14)	-0.10 (0.05)	-0.30 (0.45)	2.24 (0.24)
			Desiccated	1.84 (0.76)	-0.08 (0.62)	-0.08 (0.62)	1.20 (0.51)
		D9	Control	2.57 (0.12)	0.31 (0.32)	0.23 (0.23)	2.33 (0.34)
			Desiccated	3.05 (0.71)	-0.10 (0.31)	0.05 (0.54)	1.86 (1.39)
		D14	Control	2.69 (0.59)	0.17 (0.20)	0.03 (0.12)	1.83 (0.48)
			Desiccated	3.04 (0.12)	0.34 (0.04)	0.34 (0.04)	2.40 (0.23)
2	8/12/2024 - 8/26/2024	D0	Control	2.82 (0.83)	-0.21 (0.21)	-0.21 (0.21)	2.98 (0.53)
			Desiccated	4.19 (0.69)	1.58 (0.73)	1.11 (1.11)	4.38 (0.00)
		D7	Control	2.74 (0.78)	0.57 (1.25)	0.70 (1.10)	3.80 (0.52)
			Desiccated	2.82 (0.17)	0.06 (0.26)	0.55 (0.64)	3.88 (0.66)
		D9	Control	2.89 (0.27)	-0.43 (0.39)	-0.30 (0.45)	3.99 (0.37)
			Desiccated	2.63 (0.24)	-0.17 (0.24)	-0.17 (0.24)	3.55 (0.36)
		D14	Control	2.47 (1.04)	0.23 (0.84)	0.23 (0.84)	3.34 (0.57)
			Desiccated	2.66 (0.30)	-0.70 (0.22)	-0.70 (0.22)	3.73 (0.41)

*tlh is the gene marker for total *V. parahaemolyticus*

**tdh is a gene marker for pathogenic *V. parahaemolyticus*

‡trh is a gene marker for pathogenic *V. parahaemolyticus*

‡‡vh is the gene marker for *V. vulnificus*

Instances where replicates were below the limit of detection (LOD; 0.3 MPN/g), half the LOD (0.15) was substituted before log transforming and averaging.

- A laboratory error occurred resulting in only two of the three replicates being analyzed.

Discussion and Scientific Conclusions from FDA Technical Assistance/Research Provided

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Application of Results

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