

Comparison of Growth and Survival of Total and Pathogenic *Vibrio parahaemolyticus* in American and Asian Oysters

M.F. Mudoh¹, A. DePaola², J. Jones², J. Krantz², J. Bowers³, M.L. Tamplin⁴, and S. Parveen¹

¹Food Science and Technology Program, Department of Agriculture, Food and Resource Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853

²Gulf Coast Seafood Laboratory, U. S. Food and Drug Administration, Dauphin Island, Alabama 36528

³Division of Public Health and Biostatistics, U. S. Food and Drug Administration, College Park, Maryland 20740

⁴Food Safety Centre, University of Tasmania, Hobart, Tasmania 7001, Australia.

Vibrio parahaemolyticus is a naturally occurring halophilic bacterium that can cause gastroenteritis in seafood consumers. Gastroenteritis is usually associated with the ingestion of contaminated seafood, especially oysters. The state of Virginia proposed the introduction of Asian oysters (*Crassostrea ariakensis*) into the lower Chesapeake Bay in the mid 1990s to aid the failing American oyster (*C. virginica*) industry which was declining due to oyster diseases. It has been reported that Asian oysters grow more rapidly than American oysters and are more resistant to diseases. Information is limited on growth and survival of total and pathogenic *V. parahaemolyticus* in post harvest shell-stock oysters under various storage conditions. In addition, no information is available about the comparison of growth and survival of total and pathogenic *V. parahaemolyticus* in American and Asian oysters. This study compared the growth and survival of *V. parahaemolyticus* in American and Asian oysters. American and Asian oysters harvested from Chesapeake Bay in the summer 2008 were stored at 5, 10, 15, 20, 25, and 30°C for selected time intervals. At each time interval, two replicates of six oysters each were analyzed for total *V. parahaemolyticus* levels by direct plating/DNA probe for the species specific thermolabile hemolysin (*tlh*) gene. Pathogenic *V. parahaemolyticus* levels were determined by MPN-qPCR analysis targeting the thermostable direct hemolysin (*tdh*) and thermostable-related hemolysin (*trh*) genes. The Baranyi D and linear models were fitted to the *V. parahaemolyticus* growth and survival data to estimate the maximum growth rate (GR). GR estimates of total *V. parahaemolyticus* at 5, 10, 15, 20, 25, and 30°C in American and Asian oysters were -0.0007, -0.0018, 0.038, 0.058, 0.099, 0.098, and -0.0019, -0.0019, 0.0072, 0.020, 0.048 and 0.084 log CFU/h, respectively. The best estimates of GR of *tdh*- positive *V. parahaemolyticus* in American and Asian oysters at 10, 15, 20, 25, and 30°C were 0.08, 0.14, 0.22, >0.27, 0.17, and 0.048, 0.17, 0.26, >0.25, 0.27, respectively. The GRs for *trh*-positive *V. parahaemolyticus* in American and Asian oysters at 10, 15, 20, 25, and 30°C were 0.0015, 0.0036, 0.016, 0.073, 0.11 and -0.0021, -0.0016, 0.013, 0.089, 0.14 log MPN/h, respectively. No growth of pathogenic *V. parahaemolyticus* was detected in American oysters at 5 °C; however, pathogenic *V. parahaemolyticus* was slowly inactivated in Asian oysters at this temperature. Although there were limited data, GRs of pathogenic *V. parahaemolyticus* appeared to be substantially greater than those observed for total *V. parahaemolyticus* in American and Asian oysters. These results also indicate that total and pathogenic *V. parahaemolyticus* multiplied more rapidly in American oysters than Asian oysters. The results of this study will assist regulatory officials with their decision to release the Asian oyster into the Chesapeake Bay.