Testing Fish Markets for Bacterial Contamination
By Isabel Ines, Willow Lane, and Katie Liakin

Introduction

Fish markets are an essential component of Barbados' economy, as they provide employment in various sectors of the fishing and processing chain (*Barbados Today,* 2021). It is important to implement proper and constant monitoring of these markets to ensure food security and consumer health. The fish microbiome and the fish's environment determine the bacterial composition of the commercial fish product (Vaiyapuri, et al. 2019; Yohans, et al. 2022). Indeed, some pathogenic bacteria in fish samples are present in low numbers since they naturally occur in aquatic and working environments (Cakh, et al. 2013).

Objectives & Hypothesis

This research project aims to assess the microbiological safety of fish in Barbadian fish markets by investigating specific points of bacterial contamination within the fish supply chain. The objectives focus on identifying contamination sources, improving testing and monitoring protocols, and safeguarding public health while supporting the country's economic stability.

It is hypothesized that smaller fish markets would have fewer bacteria on their surfaces due to lower traffic. In contrast, the bacteria content of the fish sold at all three markets would be comparable. It is also hypothesized that ice samples in contact with fish will have a higher coliform content, while water used to clean the fish and surfaces would be free of bacteria.

Methods

The observation of bacteria present in three different markets was recorded over a 6-week period using membrane filtration to observe the number of bacteria from week to week, testing Fecal Coliform, Total Coliform, and Fecal *Streptococci* in the water and ice samples. Petrifilm™ testing was also used to detect the presence of *Enterobacteriaceae* and *Staphylococcus* species in the swab and fish samples.

Results & Discussion

In this investigation of bacterial contamination, varying degrees of positive growth were observed across all test types, with *Staphylococcus* species being the most prevalent bacteria throughout the sampling period. The observed correlation between larger fish markets and higher bacterial presence presents a promising opportunity to enhance the testing protocol by adopting a risk-based design. Additionally, these findings underscore the importance of vigilant monitoring and control measures to ensure the safety of the tested samples.

Conclusion & Recommendations

This investigation into the microbiological safety of fish in Barbadian fish markets has provided valuable insights for informing actions to protect public, environmental and economic health.

Customizing testing protocols based on the specific fish species available in the market is another opportunity further to optimize the testing protocol for accuracy and resource use. Additionally, including additional tests for non-target organisms and heavy metals will provide a more comprehensive assessment of overall fish product safety.

Acknowledgments

References

Barbados Today, (2021). A rich tradition of fishing. https://barbadostoday.bb/2021/11/30/a-rich-tradition-of-fishing/

Cakh, et al. (2013). *Hygiene requirements, controls and inspections in the fish market chain*. Food and Agriculture Organization of the United Nations. https://www.fao.org/3/i3221b/i3221b.pdf

Vaiyapuri, M., Joseph, T. C., Rao, B. M., Lalitha, K. V., & Prasad, M. M. (2019). Methicillin-Resistant Staphylococcus aureus in Seafood: Prevalence, Laboratory Detection, Clonal Nature, and Control in Seafood Chain. *Journal of Food Science*, *84*(12), 3341-3351. https://doi.org/10.1111/1750-3841.14915

Yohans, H., Mitiku, B. A., & Tassew, H. (2022). Levels of *Escherichia coli* as Bio-Indicator of Contamination of Fish Food and Antibiotic Resistance Pattern Along the Value Chain in Northwest Ethiopia. *Veterinary medicine (Auckland, N.Z.)*, *13*, 299–311. https://doi.org/10.2147/VMRR.S373738