

# Real-Time Monitoring of TVC Using Non-Invasive Bioluminescence Growth Media



Ryan Marder, Brandon Katz, Paul Meighan, Delia Calderon, Hygiena, Camarillo, CA

## Introduction

Establishing a hazard analysis critical control point system has become a necessity for food handling and processing plants. It has been shown that validation of HACCP can be accomplished effectively by environmental monitoring of total viable bacteria <sup>1</sup>. This study introduces a new technology from Hygiena, MicroSnap Surface Express, for real-time monitoring of non-specific viable bacteria from surfaces. Viable bacteria collected from surfaces begin to produce light as they metabolise a new substrate. The light emitted per bacterium is then utilized by a new method to enumerate the bioburden present in the sample.

## Purpose:

To demonstrate performance of MicroSnap Surface Express Total (MSX Total) in the field as an alternative rapid method for the detection of viable bacteria from environmental samples in a single, self-contained device. The test is designed to make detection from surfaces simpler and quicker for food manufacturers and food service retailers by allowing early detection using a novel real-time total viable count detection technology.

## Method:

Forty seven sites within a food plant were sampled. Samples were then split into 2 portions: one portion was inoculated into MSX Total devices and incubated, the second portion was inoculated onto agar to attain total aerobic plate counts. MicroSnap Surface Express Total devices were incubated at 30°C and their bioluminescent output was measured hourly for a total of 12 hours. Agar plates were incubated at 30C for 24 hours. Agar plate counts were then compared to the MSX Total hourly results.

## Results:

Detection of total viable bacteria was inversely proportional to the CFU. Bioluminescent detection of >5000 CFU was available after 5 hours of incubation. The mean time to detection, for the 1001 to 5000 CFU bin was <6 hours, <7 hours for the 101 to 1000 CFU bin, <10 hours for the 11 to 100 CFU bin and <11 hours for <10 CFU. Therefore, the higher the CFU, the quicker the determination of positive results with MSX Total.

## Significance:

MicroSnap Surface Express Total equips food processors with a new ultra-rapid tool for detecting viable bacteria from surfaces, providing faster HACCP validation and CCP verification.

Figure 1. Methods: sampling and processing timeline

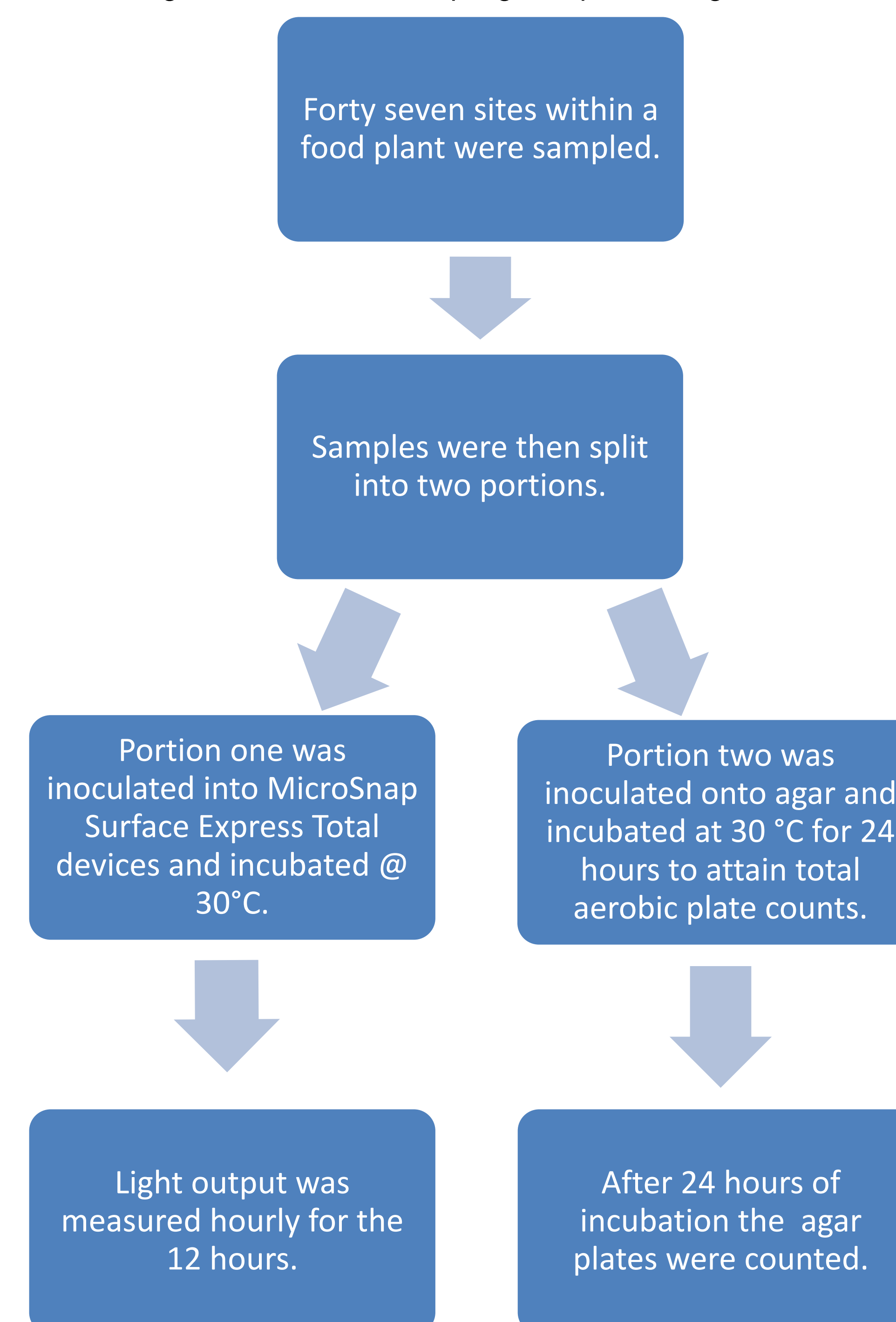


Figure 2. Mean hours to obtain positive (>10 RLU EnSURE) compared to CFU levels on Petrifilm APC

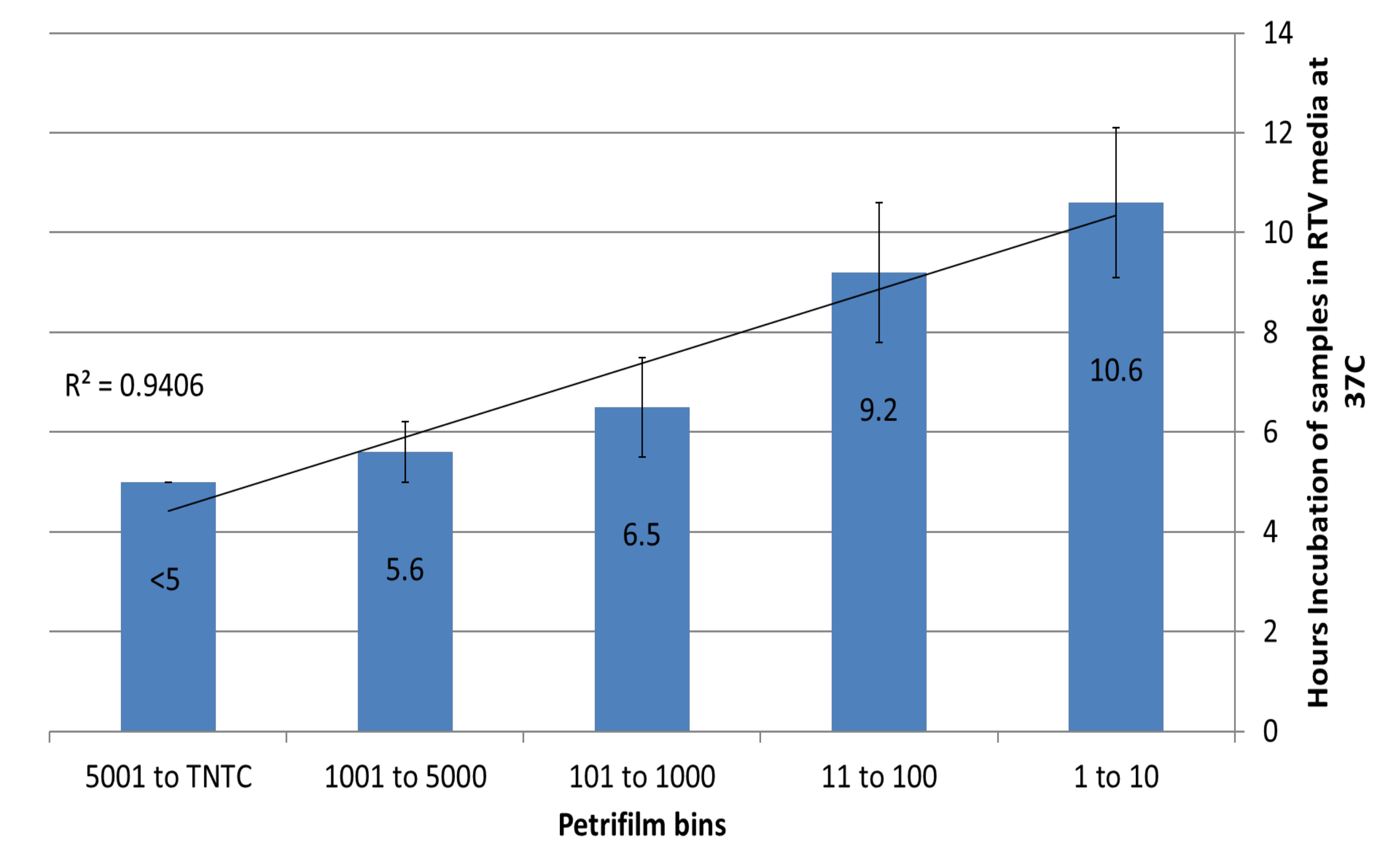


Figure 3. Probability of Detection compared to Petrifilm positive determinations at each hour (n=5 to 10).

Incubation Time	Petrifilm/Agar Positives	Real Time Viability (MSX Total)											
		1	2	3	4	5	6	7	8	9	10	11	12
24 hours	16	9	8	8	8	9	10	11	12	14	14	15	16
PoD%	100%	56%	50%	50%	50%	56%	63%	69%	75%	88%	88%	94%	100%

References: 1. Hong, CH., Todd, EC., & Bahk, GJ. Aerobic plate count as a measure of hazard analysis critical control point effectiveness in pork processing plant. Journal of Food Protection. 2008 Jun; 71(6):1248-52. PubMed PMID: 18592754.