CHAPTER 1 INTRODUCTION

1.1 Introduction

Thailand has been among the world leaders in exporting agricultural produce, ready-to-eat products and other food-related items. These export products must fulfill the international hygiene standards, such as HACCP and GMP (Atsuka et al., 2010). The maintenance of the highest standards of quality and hygiene is the key of Thailand's competitiveness to meet the world's demanding markets. The presence of pathogenic microorganisms in the export food products or the failure to detect these pathogenic contaminants may lead to a dreadful and costly effect. Although the world's food safety and export food quality have dramatically improved over the year, the advances in food manufacturing technolgy is uneven and foodborne outbreaks from microbial contamination, chemicals and toxins are still common in many part of the world (WHO, 2007).

All industrial food products must go through rigorous quality controls for sensory and microbiological analyses. There are quite a few key food-borne pathogens and microbial hygienic indicators. Among many pathogens causing frequent food-borne outbreaks, there are *Listeria monocytogrnes*, *Vibrio vulnificus*, *Salmonella typhi*, *Staphylococus aureus* and *Escherichia coli* O157:H7 (Diane, 2010; Vijayalak et al., 2010). Especially, *E. coli* O157:H7 is considered one of the most dangerous pathogens as the cell number required for infection is low (Biao, 2010). Except for the symptom of bloody diarrhea, in some cases the infection of *E. coli* O157:H7 can be complicated by hemolytic uremic syndrome, which may lead to kidney failure or death (Griffin, 1991). The consequence of the infection imposes a lot of social and financial setbacks. Also the presence of yeast/mold indicates a significant quality link of the entire food production chain because that considered a good indicator for poor hygienic condition of production sanitation. Some moulds can grow and produce mycotoxins such as *Fusarium ameniacum* produces Beauvericin while certain yeasts and moulds can cause infections or allergies (Wayne, 2012).

Conventional plating methods are mostly used for the isolation and enumeration of food-borne pathogens and yeast/mold in foods. A widely-utilized technique is the FDA official method for the mycological analysis of foods (BAM, 2001). This method requires relatively long time and substantial analyst effort for media preparation and a 5- day incubation period (Tournas et al., 2011). A serious drawback is that, although the conventional methods demand no expensive infrastructure and are rather cheap in consumables, they are laborious to perform, demand large volumes usage of and solid media and reagents, and involve time-consuming procedures both in operation and data collection. Alternative microbiological methods may help the industry to find new ways of obtaining reliable results more efficiently to ensure high standards of food safety (Vicky, 2010). The micro-scale cultivation and digital microscopy-assisted technique have been proposed to reduce the workload and facilitate the work flow by reducing the manipulations and/or the necessity for a full lab infrastructure (Saeaung, 2010; Supanivatin, 2011). This concept can be used to shorten the time to perform Total Plate Count (TPC), yeast and mold detection.

The purposes of this research were to propose the alternative method for detection of TPC, yeast/mold and perform the validation of the new technique with the standard method.

1.2 Objectives

1. Develop fast and efficient TPC, yeast and mold detection methodology to promote a high throughput industrial routine detection.

2. Explore optimal conditions for TPC, yeast and mold growth and visual improvement of colony detectability.

3. Evaluate and optimize TPC, yeast and mold enrichment to accelerate analytical routines for industrial application.

1.3 Scopes

1. To optimize growth conditions and growth parameters in micro-scale environment cultivation for achieving the highest growth of TPC, yeast and mold.

2. To improve sensitivity and effectiveness of the agar enrichment step, lower medium cost and simplify enrichment procedure for TPC, yeast and mold detection in suspended cell cultivation.

1.4 Expected Benefits

1. To shorten and simplify the conventional protocol allowing industry to perform microbiological analysis as often as possible.

2. Provide high throughput platform of rapid and efficient TPC, yeast and mold detection for safety purposes.

3. Save millions of baht worth of samples contaminate detection of finished goods being destroyed at oversea port of entry.