

# Comparison of 3M Petrifilm Staph Express Count Plates, and 3M Petrifilm Rapid Coliform Count Plates with Standard Bacteriology of Bovine Milk

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## Introduction

Isolation and identification of mastitis pathogens is a fundamental step in milk quality control programs. There is a need for an inexpensive and rapid bacteriologic test that allows veterinarians as well as dairy producers to make real-time decisions to better manage udder health in their herds. Petrifilm plates may fill this gap. Petrifilm plates are ready-to-use culture media that are used primarily in the food industry. The objectives were 1) Evaluate the test characteristics of the Petrifilm Staph express Count Plates (STX) for identification of *S. aureus* from milk. Milk samples were taken from cows a) in the first 30 days in milk, b) with high somatic cell count (SCC) during lactation, c) with clinical mastitis. 2) Evaluate the test characteristics of the Petrifilm Rapid Coliform Count Plates (RCC) for identification of coliforms from cases of clinical mastitis.

## Materials and Methods

In both objectives, the agreement (Kappa) between STX, and RCC, standard bacteriology and the gold standard was evaluated. The effect of the test characteristics of STX, and RCC plates when a diluted sample 1:10 was used, compared to an undiluted sample was determined. As well as, the test characteristics of the STX, RCC plates were evaluated after freezing clinical mastitis milk samples. A sample was considered positive for bacteria (gold standard) if: bacteriology (primary or incubated) was positive for the bacteria or Petrifilm culture was positive for the bacteria and identification of the Petrifilm isolate was confirmed by bacteriology.

## Results

1) a) A total of 1203 fresh milk samples were used in the analysis. The sensitivity (Sn) and specificity (Sp) of the STX for non-diluted (ND) and diluted (D) samples were 67.9, 99.1%, and 75.4%, 98.9%, respectively. The agreement (Kappa) between the two tests and the gold standard was 0.750 and 0.797. The D samples had the

best agreement although ND samples were also very good. b) 300 fresh milk samples were analysed. The Sn and Sp of the STX for ND and D samples were 77.2%, 98.2%, and 82.5%, 98.8%, respectively. The agreement between the two tests and the gold standard was excellent at 0.804 and 0.852. c) A total of 517 milk samples (319 fresh and 198 frozen) were used in the analysis. The test characteristics of the STX were the highest for D samples fresh samples, with a Sn and Sp of 67.9%, 99.2%, respectively, and kappa of 0.705. For frozen samples, the Sn and Sp were similar for ND samples with a Sn, Sp, and Kappa of 64.9%, 100%, and 0.750, respectively. When bacteriology was compared to the gold standard for fresh clinical mastitis samples with the STX, the agreement was excellent with Kappa =0.941. 2) For the evaluation of the RCC for clinical mastitis, a total of 522 (318 fresh and 204 frozen) samples were analysed. The Sn and Sp of the RCC for ND and D fresh samples was 79.0%, 98.8% and 80.6%, 99.2%, respectively. The agreement between the two tests and the gold standard was excellent at 0.829 and 0.850. The D samples had the best agreement but ND samples were very good. Using frozen samples, the test characteristics and kappa for ND samples was 73.0%, 99.9%, and 0.780. For D samples the results were numerically improved at 78.8%, 99.0% and 0.827. For samples that arrived fresh, were frozen and then replated, the Sn and Sp for non-diluted samples was 67.6%, and 98.6%, with a Kappa of 0.736. Therefore diluted samples were slightly better for fresh and frozen samples but ND was improved for fresh-frozen samples.

## Significance

The Petrifilm culture system has potential as an important on-farm diagnostic tool. The results demonstrated that it is comparable with standard bacteriologic culture for the isolation of *S. aureus* and coliforms. Making udder health treatment decisions based on bacteriologic results will help to reduce risks associated with unnecessary antibiotic treatment, benefiting both the cow and the consumer.