# STUDIES ON PSYCHROTROPHIC MICROORGANISMS IN MILK AND MILK PRODUCTS

by

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## ABSTRACT

Psychrotrophs are those microorganisms that can grow at $7^0$C or less, irrespective of their optimal growth temperatures, which cause defects in refrigerated milk and milk products. A total of 154 samples, including 80 raw milk, 24 pasteurized milk , 15 ice cream, 10 cheese, 10 butter, 10 yoghurt and 5 curd samples were tested in the present study. Enumeration of mesophilic flora, enumeration and isolation of psychrotrophic flora were carried out from each product. Isolation of thermoduric psychrotrophs at laboratory pasteurization temperature ( $75^0$C for 20 minutes) was accomplished in 36 raw milk samples. Psychrotrophs and thermoduric psychrotrophs were isolated from the above samples. The isolates of psychrotrophs were also tasted for proteinase and lipase activities. Proteinase activity was measured qualitatively by streaking on 10 % skim milk agar and quantitatively by measuring the absorbance of digested protein by bacterial proteinase. Lipase activity was measured qualitatively by streaking on tributyrin agar and quantitatively by a titration method. Heat stability of enzymes of psychrotrophs isolated from pasteurized milk were also tested at $72^0$C for 15 seconds (commercial pasteurization conditions.)

The mean psychrotrophic counts of raw milk just after delivery to the collecting centre and milk in bulk storage tanks at the centre before and after chilling at Yatinuwara area were $2.98 \times 10^7$, $6.29 \times 10^7$, $7.12 \times 10^8$ and at Kundasale $3.53 \times 10^7$, $8.98 \times 10^8$ and $9.27 \times 10^8$ cfu/ml respectively. The chilling period of milk in bulk tanks was 48 hours at Yatinuwara and 24 hours at Kundasale. The increase in percent psychrotrophic count during chilling were 3.22 at 24 hours and 1031 at 48 hours.

This data showed a significant psychrotrophic bacterial increase in 48 hours cooling than in 24 hours. The bacterial genera isolated from raw milk were Pseudomonas, Flavobacterium, Escherichia, Micrococcus, Streptococcus, Staphylococcus and Lactobacillus. Of the psychrotrophs in laboratory pasteurized milk 9.5 % was found to be thermoduric and the genera included Micrococcus and Bacillus.

Seventy three percent of the samples of milk products contained mesophilic counts above the recommended standard limits. However the standard limits for psychrotrophs in milk and milk products are not stated in the Sri Lanka standards. The psychrotrophic genera isolated from products were Pseudomonas, Escherichia, Proteus, Micrococcus, Bacillus and Flavobacterium. Other than these, two types of morphologically different yeasts were also isolated from butter and cheese.

Of the isolates from milk and milk products 29 and 63 % were proteolytic and lipolytic respectively. These extra-cellular enzymes of psychrotrophs isolated from pasteurized milk available in the market that had been subjected to commercial pasteurization condition ( at $72^0$C for 15 seconds) showed heat stability. According to these results, the production hygiene of the milk and milk products should be improved.