

**INVESTIGATION OF THE MICROBIOLOGICAL PROBLEMS IN A
LARGE SCALE YOGHURT MANUFACTURING PLANT AND
MEASURES FOR REMEDIATION**

**MANOJA PRIYANI GUNAWARDHANA
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ABSTRACT

Yoghurt is a fermented milk product, this is best known popular and nutritious food item in Sri Lanka. In one of the large scale yoghurt manufacturing plants in Sri Lanka, 2-10% of yoghurt manufactured daily is rejected due to non setting of the yoghurt mixture during the specified period. Further the marketed product is returned due to fungal growth and poor shelf life. These quality defects have caused loss of high income and less productivity. Therefore this research project was carried out to investigate the cause of problem and suggest method for remediation.

A total of 190 samples of set yoghurt and non set yoghurt were examined to determine the acidity, pH, total viable count, Coliform and *Escherichia coli* counts using methods specified in the Sri Lanka Standard. A total of 30 samples of both set and non set yoghurt, a total of 10 air samples of the processing area and a total of 25 rejected samples of set yoghurt with fungal contamination were examined to determine the yeast and moulds. Detection of the isolates from each steps of the yoghurt processing line, sources of microbial contamination and environment of the processing area carried out up to species level.

Isolates obtained from set and non set yoghurt were examined to determine the microbial responsible for non setting of yoghurt under laboratory condition. Activity and purity of the starter culture were determined quantitatively by measuring the titratable acidity of yoghurt mixture and growing the starter culture on MRS agar and preliminary identification of isolates.

As the suggestions for remediation, sterilizations of empty cups using 30% warm H₂O₂ and detection of the starter culture activity in the sterilized cups were carried out under laboratory condition.

The mean acidity as percentage of lactic acid of set and non set yoghurt samples were 0.808 and 0.569 respectively and the mean acidity of set and non set yoghurt were 4.51 and 5.81 respectively. According to the enumeration there are no significant different between the mean total viable counts of the two type of yoghurt. But predominant type of microorganisms namely as *Bacillus schlegelii* was identified in set yoghurt while *Bacillus circulans I* and *Bacillus megaterium B* in non set yoghurt.

Although no contaminant microflora was detected in UHT milk, contaminant species of *Bacillus* namely *B. schlegelii* was identified in farm tank milk. Isolates from contaminant sources of yoghurt processing were *B. circulans I*, *B. circulans G*, *B. licheniformis*, *B. subtilis* and *B. schlegelii*. Some of the isolates namely *B. badius*, *B. polymyxa*, *B. circulans I*, *B. sphaericus* and *B. pumilus* were identified from environment in processing area. A high viable count of *B. circulans I* was present in the some of empty cups, other utensils and environment in processing area. So results clearly indicate that contaminant sources of yoghurt process line and poor environment hygiene has greatly contributed to contaminate *B. circulans I* which is responsible for non setting of yoghurt.

Air of the process area and rejected samples of set yoghurt from the market contained same types of moulds, namely as *Mucor* and *Penicillium*. In addition to these species, *Aspergillus* also was detected in the air and *Mucor* was detected in the non set yoghurt. The results of the activity and purity of starter culture used in this investigated yoghurt manufacturing plant was of acceptable activity and purity.

No contaminant microflora were detected in sterilized empty yoghurt cups which were effectively sterilized using 30% warm H₂O₂ without any effect on the activity of the starter culture. Application of the good manufacturing practices (GMP) and designing of Hazard Analytical Critical Control Point (HACCP) system were recommended to maintain the quality of yoghurt production.