

Identification of possible contamination points in small- scale yoghurt processing plants in Kandy district

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Yoghurt is a popular fermented milk product in Sri Lanka manufactured by small-scale as well as large-scale producers and often reaches the retail market without quality certification. Previous studies have identified low-quality yoghurts in the local market that were produced by small-scale processors. Therefore, the objective of this study was to identify possible contamination points along the yoghurt manufacturing process.

Nine small-scale processors from the Kandy District were selected and critical contamination points of their production lines were identified using microbiological analysis. Three production lines were tested in each processor from March 2014 to May 2016. Samples were collected from four pre-identified points in the process: namely, raw milk (n=27), boiled milk (n=27), milk after inoculation of the starter culture (n=27) and the final products (n=98). Samples were tested for Total Bacterial Count (TBC), presence of *Escherichia coli* (*E. coli*), yeasts and moulds according to procedures from Sri Lanka Standard Institution (SLSI). Data were interpreted based on SLSI standards for yoghurt and EU standards for raw milk.

Detailed analysis of production lines enabled identification of common contamination points. On the basis of EU standards, 66.6% of raw milk samples were microbiologically poor in quality due to high TBC ($>10^5$ CFU/ ml). *E. coli* were detected in 74.1% of raw milk samples. Of the boiled milk samples, 96.3% were microbiologically safe revealing that majority of the processors followed effective heat treatment irrespective of raw milk quality.

Of the 27 production lines, 13 batches had yoghurt of unacceptable quality due to presence of *E. coli*, yeasts and moulds. Of these, nine batches were unacceptable due to one of the above parameters and only one batch did not satisfy all three quality parameters. Since boiling was an effective method of making raw milk safe, post-heat treatment contamination could be the reason for poor quality of yoghurt in the above 13 batches.

The majority of processing operations produced microbiologically-safe yoghurt as 14 batches complied with SLSI standards. It may be possible to increase this number by education of small-scale dairy processors on the importance of hygienic production concerning both public health and economic aspects.

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