

An example of the application of HACCP principles and methodology to the safety of raw milk production - monitoring raw milk contamination from udder origin

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Introduction

A hazard analysis and critical control point (HACCP) plan for raw milk production in dairy farms needs monitoring tests for the critical control point (CCP) management (monitoring and corrective action taking). The bulk milk tank was considered the CCP where the control of bacterial contamination of udder origin could be achieved, using somatic cell count (SCC) in milk as the monitoring parameter. The verification can be also done with SCC using adequate Statistical Process Control (SPC) tools (Niza-Ribeiro, J. et al., 2000). The California Mastitis Test (CMT) is currently used as a cow side test in udder health monitoring. CMT is either quick and inexpensive and can be performed by the ordinary herdsman. A previous validation of CMT was necessary before its adoption as a monitoring test in HACCP plans. Part of the validation (experiment 1) consisted in the evaluation of the precision characteristics (repeatability and reproducibility) of the test to appraise the possibility of its use by common operators in any farm, as well as the effect of training on the individual performance. The second part of the validation (experiment 2) consisted in investigate the role of the mammary gland in raw milk contamination and the possibility of using CMT scores to identify the quarters shedding milk with heavy bacterial contamination. The results from experiment 1 & 2 were satisfactory but as the ordinary CMT was rather inaccurate to be used directly in the monitorization of BMTSCC, a modification of the method was attempted. The validation of this modified CMT was carried out (experiment 3) to evaluate the test's accuracy to monitor the bulk milk tank (BMT).

Material and Methods

Experiment 1

Series of dilutions of milk with 22 bottles each were prepared with a protocol according to Schneider . A simplified protocol, based in the previous one, was used to prepare series of 9 bottles. The *repeatability* was calculated as the proportion of the duplicates with the same score within all the duplicates in the series. *Reproducibility* was calculated as a proportion of duplicate coincident test scores in the run. Two different panels of operators were challenged: one had 6 farm advisers which performed each 10 trials (test runs) of 22 duplicated samples randomly distributed; in total 2640 tests were done by this panel; the