

## ANALYSIS OF RISK FACTORS THAT AFFECT THE BACTERIOLOGIC QUALITY OF MILK SUPPLIED TO MILK COLLECTION CENTERS IN CHILE

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Three components have to be considered in the milk production chain: the milk producers, the milk transformers (dairy plant) and the consumer of milk and milk products. In Chile the smaller producers often do not have access to dairy plants and have to sell their milk to Milk Collection Centers. Some milk producers sell their milk directly to the consumer, which creates a public health problem because of the bacteriologic quality of the milk. There are many factors that affect the bacteriologic quality of the milk on the farm. These factors either are related to the animal, or to the physical, technological, economical or political environment. The objective of this study was to analyze the potential hazards or environmental risk factors that affect the bacteriological quality of milk supplied by producers to the Milk Collection Centers.

Six herds with 5 to 18 cows were selected from the register of 100 milk producers of 8 Milk Collection Centers (MCC) of the X<sup>TH</sup> region in Chile, based on manual or mechanical milking, and location of milking. Herds were evaluated between December 1997 and March 1998, using Hazard Analysis and Critical Control Points (HACCP) methodology. Bacteriological analysis was performed on milk clusters, milkers' hands, milk cans, other utensils and water. The following bacteriological tests were performed: aerobic mesophilic plate counts, most probable number (MPN) of coliforms, fecal coliforms, *E. coli biotypes 1*, and *Staphylococcus aureus*; and *Bacillus cereus* count.

A milk flow-diagram was defined and included production, extraction (manual or mechanical), filtration in manual milking, accumulation, cooling, storing, transport to the Milk Collection Centers. The detected Critical Control Points were milk production, specifically the cow selection at milking, and cooling. High bacterial contamination levels were detected in milk clusters, milkers' hands, milk cans, other utensils and water. Immediately after milking, bacterial counts were  $1.8 \times 10^3$  to  $9.1 \times 10^7$  cfu/ml, and coliforms and *Staphylococcus aureus* were isolated on all six farms, *Bacillus cereus* and fecal coliforms were isolated on 3 farms. Bacterial counts in milk increased from accumulation to arrival at the Collection Centers, because time and temperature conditions permitted microbial survival and multiplication. From the Public Health point of view, milk from 3 of the 6 farms was not suitable for human consumption with total bacterial counts of  $5.4 \times 10^6$  cfu/ml,  $1.9 \times 10^7$  cfu/ml and  $7.5 \times 10^7$  cfu/ml, and the milk from the other three farms needed pasteurization. Only one farm received a quality premium from the milk plant.