

Microbiological Safety of Raw Milk in Tabriz, Iran

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Abstract: The microbiological safety of raw milk in Tabriz city was determined. A total of 45 raw cow milk samples were collected at Ilkhichi Milk Collection Center from the Tabriz suburbs dairy farms. Samples were analyzed for Total Plate Count (TPC). The mean counts per ml for TPC was $(1.36 \pm 0.28) \times 10^6$.

Key words: Microbiological safety, raw milk, Iran

INTRODUCTION

Milk is a nutritious food for human beings, but it also serves as a good medium for the growth of many microorganisms, especially bacterial pathogens. *Lactococcus*, *Lactobacillus*, *Streptococcus*, *Staphylococcus* and *Micrococcus* sp. are among common bacterial flora of fresh milk. The flora may also predominate by psychrotrophs if the milk is kept cool before further processing (Bishop and White, 1986; Sorhaug and Stepaniak, 1997). The detection of coliform bacteria and pathogens in milk indicates a possible contamination of bacteria either from the udder, milk utensils or water supply used (Olson and Mocquot, 1980; Bonfoh *et al.*, 2003). Fresh milk drawn from a healthy cow normally contains a low microbial load (less than 1000 mL^{-1}), but the loads may increase up to 100 fold or more once it is stored for some times at normal temperatures (Richter *et al.*, 1992). However, keeping milk in clean containers at refrigerated temperatures immediately after milking process may delay the increase of initial microbial load and prevent the multiplication of micro-organisms in milk between milking at the farm and transportation to the processing plant (Adesiyun, 1994; Bonfoh *et al.*, 2003). Contamination of mastitis milk with fresh clean milk may be one of the reasons for the high microbial load of bulk milk (Jeffery and Wilson, 1987).

The importance of various etiological agents in milkborne disease has changed dramatically over time. However, more than 90% of all reported cases of dairy related illness continued to be of bacterial origin, with at least 21 milkborne or potentially milkborne diseases currently being recognized (Bean *et al.*, 1996). Pathogens that have been involved in foodborne outbreaks

associated with the consumption of milk include *Listeria monocytogenes*, *Salmonella*, *Campylobacter*, *Staphylococcus aureus*, *B. cereus* and *Cs. botulinum*. The presence of these pathogenic bacteria in milk emerged as major public health concerns, especially for those individuals who still drink raw milk (Ryser, 1998). Keeping fresh milk at an elevated temperature together with unhygienic practices in the milking process may result in microbiologically inferior quality. The microbiological criteria which are currently in force it is the Total Plate Count (TPC) not exceeding 1000000. In advance to distinguish 3 classes: extra class, with the TPC not exceeding 100000, class <500000 and class <1000000.

This study was carried out to investigate the microbiological quality and safety of locally produced raw milk.

MATERIALS AND METHODS

A total of 45 raw cow milk samples were collected at Ilkhichi Milk Collection Center from the Tabriz suburbs dairy farms. Samples were analyzed for Total Plate Count (TPC). Samples were analysed for their microbiological quality. Enumeration of Total Plate Count was carried out as described by standard methods of the American Public Health Association (Vanderzant and Splittstoesser, 1992).

RESULTS AND DISCUSSION

Generally, fresh raw milks collected from farms were heavily contaminated by bacteria with a mean Total Plate Count (TPC) of $(1.36 \pm 0.28) \times 10^6$ (Table 1). Table 2 summarizes the results of the raw milk classification of examined samples.

Table 1: Statistical analytical results of total plate count/mL of examined samples

Product	No. of examined sample	Positive No	Samples (%)	Min	Max	Mean	±SE
Raw milk	45	45	100	4.6×10 ⁴	9.3×10 ⁶	1.36×10 ⁶	±0.28×10 ⁶

Table 2: Raw milk classification of examined samples

Classes of milk	No. of positive samples	Percentage of positive samples (%)
Extra	4	8.88
I	20	44.44
II	27	60

Possible reasons for the high counts could be due to infected udders of the cows, unhygienic milking procedures or equipment and/or inferior microbiological quality of water used for cleaning utensils and animals, as well as the milk storage conditions. Therefore, poor milk quality has often been considered as one of the major reasons for losses and results in deduced income for the smallholder dairies in Malaysia. The milking process, especially the equipment associated with it, introduces the greatest proportion of micro-organisms in raw milk (Olson and Mocquot, 1980; Cousin, 1982). The health of the dairy herd, milking and pre-storage conditions are also basic determinants of milk quality. Bacteria may enter milk while it is in the udder and most of the organisms in raw milk are contaminants from the external surface of udder, milking utensils and handlers (Ayres *et al.*, 1980). Various types of equipment and utensils, such as milking machines, pails, cans and milk churns are used in handling milk on the farm. In order to reduce contamination of milk, utensils used for milking should be rinsed, cleaned using detergent and disinfected immediately after use (Dodd and Phipps, 1994; FAO and WHO, 1997). The use of detergents and good quality water for cleaning the equipment could be expected to remove milk remains including micro-organisms and thereby affect the microbiological quality of milk. Practicing very good hygiene principles at the farms, in handling and transportation of milk, is a must. It is important to cool raw milk quickly and to store it no longer than necessary. Equipment that is poorly designed with respect to cleaning and potential for fouling represent another hidden source of psychrotroph and thermophilic bacteria, as well as the destructive enzymes.

CONCLUSION

Results of the study clearly indicated that microbiological quality of raw milk produced by local farmers was inferior. High microbial counts is likely to affect the keeping quality and safety of raw milk as well as products derived from it. It is recommended that training and guidance should be given to farms' owners and their workers responsible for milking, emphasizes the need for

hygienic practices at the farms. Meanwhile, information on health hazards associated with contaminated raw milk should be extended to the public, so that consumption of untreated raw milk could be avoided.

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