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Comparison of microbial contamination of milk from traditional and industrial farms

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ABSTRACT

Milk is a valuable food source requiring proper storage. In this study 40 milk samples from traditional farms and 30 samples from industrial farms of two Iranian provinces, Mazandaran and Kordistan, were collected and then their microbial loads were investigated and compared. Microbial load of milk obtained from traditional farms was very great and in many cases was not within standard range. There was always a significant difference between the samples collected from traditional and industrial farms.

Key words: Milk, microbial contamination, traditional and industrial farms.

INTRODUCTION

Milk is a perfect natural food for human nutrition. Milk composition and temperature after milking provide a favorable media for bacterial growth. Contaminated milk may cause diseases such as tuberculosis, brucellosis, lysteriosis, and different kinds of gastrointestinal disorders as well as poisoning (Boor and Brown, 1998). Milk contamination occurs through two main ways. Direct contamination by microbes occurs through diseased animals and indirect contaminations occur by mastitis and the environment. When cows are suffering from animal diseases microorganisms attack udder tissue and contaminate the produced milk in udders (Robinson, 2002). Also if injured by any external agents and develops mastitis, the peripheral microbes enter the tissue and cause infection. Then they reproduce and enter to the milk thereby increasing milk microbial load. Indirect contamination occurs through different ways. Lack of sanitation in farms leads the microorganism to reproduce and enter the milk when milking (Allore *et al*.,1997).The forage used for animal feeding must be stored in a clean and dry place away from contamination sources. Contaminated forage may result in contaminated unhealthy milk. Given the fact that in dairy farms, microorganisms are present in high amount and that the workers are in direct contact with the farm environment lack of sanitation and sterilization of the hands prior to milking because the microbes contaminate the milk. In addition the presence of microbes on the udder skin is inevitable because the udder tissue is in contact with the bed (Early, 2000). The insects may transfer the contamination from the animal feces to the milk thereby increasing the microbial load. In industrial farms the produced raw milk shows less contamination because of using developed machinery where as in traditional farms there are no proper facilities resulting in increased contaminated raw milk. High microbial loading ultimately will threaten the consumer's safety and affect negatively on the texture, technological and sensory properties of the final product (Kirk and John, 2003).

The production process is being gradually transferred into industrial one. Over 70% of the required milk is provided by the traditional farms and less than 30% is produced by the industrial dairy farms. The aim of this study was to

compare the microbial load of milk obtained from traditional and industrial farms of two Iranian provinces Kordistan and Mazandaran.

MATERIALS AND METHODS

The milk samples were collected from April to September in 2012. 40 samples were collected from the industrial and traditional farms under aseptic conditions. They then were poured into sterile plastic bags transferred to the laboratory being in the vicinity of ice. Living cell count was done using pour plate method on plate count agar according to the standard and then incubated at 37. After 48h living cell count was done (ISIRI, 2001).

Data Analysis

The data analysis was performed using SPSS statistical software. Data collected from this study were analyzed based at 0.05% coefficient of error.

RESULTS AND DISCUSSION

The results of microbial tests on raw milk obtained from traditional and industrial farms of two Iranian provinces, Kordistan and Mazandaran are presented in Tables 1 and 2. As shown in the tables, milk is classified into 4 grades according to Iranian National Standard and microbial load. Among the samples collected from traditional farms of Kordistan, only 2 samples were classified as Grade 1, 3 samples as Grade 2, 9 samples as Grade 3, and 8 samples were assigned Grade 4. According to the results 18 samples showed very high degree of contamination suggesting lack of sanitation in traditional dairy farms. The samples collected from industrial farm showed more satisfactory quality as compared to samples obtained from traditional dairy farms as all samples were within standard range, and only 2 samples showed high microbial load being classified as grade 4. The samples collected from Mazandaran showed a similar trend. For traditional – made samples, 50 percent of samples appeared out of standard range with an average microbial load of $5.6*10^5$. All industrial – made samples were within standard range with an average microbial load of $7.5*10^4$. It should be noted that comparison of microbial load of samples collected from both traditional and industrial dairy farms in both provinces, showed a significant difference. Khomiri and Ghasemianfard, (2006) conducted a similar study in Gilan and obtained similar results. They noted that there was always a significant difference between the samples collected from traditional and industrial dairy farms (Khomiri and Ghasemianfard, 2006**)**.

Table1: Total microbial contamination in traditional and industrial farms in Kordistan

No	Total count (cfu/ml)	Number of samples		Grade of milk *
		Industrial	Traditional	
1	<100000	7	2	1
2	100000-500000	23	3	2
3	500000-1000000	8	9	3
4	1000000-5000000	2	8	4
5	>5000000	-	18	Out of standard limit

**International standard of Iran*

Table1: Total microbial contamination in traditional and industrial farms in Mazandaran

No	Total count (cfu/ml)	Number of samples		Grade of milk *
		Industrial	Traditional	
1	<100000	10	1	1
2	100000-500000	21	4	2
3	500000-1000000	8	11	3
4	1000000-5000000	3	9	4
5	>5000000	-	15	Out of standard limit

**International standard of Iran*

CONCLUSION

Given the high nutritional value of milk and persisting need to this product its proper storage is a crucial matter. The results obtained from this study and other similar researches indicate the necessity of industrializing the traditional farms. Along similar lines promoting the awareness of operators of the types of actions they are doings and of animals providing related courses, adopting protective policies such as supplying adopting construction materials, as well as bank facilities are among governmental protective measures in order to industrializing traditional farms.

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