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Scientific Note

Influence of farm conditions on the production of hygienic milk

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Milk is one of the most common food sources in the human diet and is also a product that is directly available for consumption (Grimaud *et al*., 2009). In Bangladesh the production of milk is very low. Most of the cows are indigenous and produce a little more than one liter milk per day (Kabir & Islam, 2009). Although measures are being taken to improve the production of local cows through artificial insemination, the improvement is not rapid due to the shortage of exotic bulls, frozen semen, trained personnel and technical facilities. At present many private dairy farms have been established but most of them follow no hygienic points for milk production.

Maintaining a high standard of hygiene is one of today's most important milk production objectives. The hygiene level directly influences economic production and dairies are enforcing this by steadily raising their quality requirements for raw milk (Jansen, 2003; Lues *et al.*, 2003; Dovie *et al.*, 2006). More importantly consumers are concerned about the safety of dairy products and the conditions under which these are produced. It is therefore important to ensure high quality raw milk from healthy animals under good hygienic conditions and that control measures are applied to protect human health.

For the study Zihan dairy farm (ZDF), Sherpur, Fatema Multi Project (FMP) (Vita Milk), Mymensigh and Beltali Krishi Khamar (BKK) (Pusti), Mymensingh were selected.

Raw milk samples (100ml) were collected aseptically into sterile bottles from three different points of each farm- one (point-1) from milking bucket of each milk collection unit/point (MCU) immediately after milking from individual cow, another (point-2) from bulk cans of each MCU after mixing of milk of different cows and last (point-3) from polythene packaged milk sold to retail stores. Bottles were kept in a large wide mouthed thermo flasks kept cool in ice and then processed immediately for delivery to the Laboratory of Microbiology, Department of Microbiology and Hygiene, Bangladesh Agricultural University (BAU), Mymensingh. A total of 30 samples (10 samples from each unit) of each farm were bacteriologicaly examined and microorganism counts were expressed in colony forming units (cfu) per ml of milk. The foregoing prepared diluted samples were subjected to Total Viable Count (TVC) in the Laboratory as well as to detect and enumerate coliform and staphylococci. TVC was accomplished according to the method described by Quinn *et al.* (1994) who prescribed serial tenfold dilution of the milk samples. The technique followed to determine the TVC by pour plate method on nutrient agar, MacConkey agar and Manitol salt agar.

The bacterial load was not uniform in different points of production in the same farm and within farms. From the results it is observed that in all three points TVC were the lowest ($54.5x10^4$/ml) in ZDF followed by a higher count ($58.8x10^4$/ml) of FMP (Vitamilk) and the highest ($77.6x10^4$/ml) in BKK (Pusti). The TVC increased progressively from the first point to the third point as recorded in sample of all farms but this increase was found to be the lowest in milk samples of ZDF. It may be due to hygienic care and handling of milk, proper cleanliness of utensils and minimum period required during production at different points and rapid cooling of milk. The TVC/ml of milk samples of FMP (Vitamilk) as well as BKK (Pusti) from point-1 towards point-2 increased poorly but from point-2 to point-3 the rate of increase was rapid. It may be attributed to longer time interval of packaging of milk and unhygienic practices.

The results of TVC were more or less similar to Golubeva (1981) who reported that the bacterial counts in unstored and stored milk sample ranged from 100000 to 5.5 million/ml and 400000 to 23.5 million/ml respectively.

The coliform count was the lowest (73.3 cfu/ml) in FMP (point-1) and the highest (154.8 cfu/ml) in BKK (point-3). In ZDF coliform increase rate from point-1 to point-3 was fairly uniform. But in FMP coliform counts from point-1 to point-2 increase rapidly which indicate post milking contamination due to faulty handling and poor hygienic practices. The BKK milk samples from point-1 to point-2 coliforms increased very slowly but from point-2 to point-3 they increased sharply. This may be due to longer holding period and contamination during transportation and measuring. The results are in agreement with the findings of Ahmed & Salam (1991) who examined bacteriologically 100 samples of market raw milk and

Domiati cheese (50 each) with a mean coliform count of 3.8 x 108.

The lowest count of staphylococci was noted in the first point of ZDF and the highest count in the third point of BKK. The average staphylococcal count in all points of individual farms was lower in point-1 and was higher in point-3. The result of the present study similar to the findings of Nader *et al.* (1990) who examined raw bulk milk collected from a milk processing plant and found S*taphylococcus aureus* having a mean count of 1190/ml.

The milk samples of first point of all the farms were of the best quality because TVC, coliform count and staphylococcal count/ml were the lowest at this point of production at all the farms.

Table 1. Examination of milk samples immediately after milking in selected farms. (Point-1)

Source of sample	Average TVC/ml (TVC/mlx10^4)	Range of TVC/ml (TVC/mlx10^4)		Average coliform/ml (cfu/ml)	Range of coliform/ml (cfu/ml)		Average staphylo-cocci/ml (cfu/ml)	Range of staphylococci /ml (cfu/ml)	
		Max.	Min.		Max.	Min.		Max.	Min.
Zihan dairy farm	54.5	75	40	90.7	115.0	64.0	24.8	42.0	14.0
Fatema Multi Project	58.8	72	41	73.3	102.0	56.0	30.9	42.0	24.0
Beltali Krishi Khamar	77.6	96	50	86.4	106.0	65.0	38.8	62.0	24.0

Table 2. Examination of milk samples from bulk cans (Point-2).

Zihan dairy farm	85.5	120.5	59.5	110.0	142.0	89.0	58.2	80.0	40.0
Fatema Multi Project	76.4	100	54	121.0	182.0	102.0	66.2	88.0	51.0
Beltali Krishi Khamar	87.8	107	66	97.6	124.0	69.0	64.9	80.0	46.0

Table 3. Examination of packaged milk samples of selected dairy farms. (Point-3)

Zihan dairy farm	109.4	120	54	119.4	131.0	108.0	71.0	92.0	63.0
Fatema Multi Project	149.5	182	108	150.4	192.0	112.0	79.1	110.0	50.0
Beltali Krishi Khamar	197.0	260	155	154.8	195.0	100.0	89.0	106.0	66.0

The hygienic production of milk requires stringent measures against contamination at every stage of dairy practices.

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