



## Short Communication

# Determination of Bacterial Loads in Milk and Beef meat Samples of Mymensingh Sadar Upazilla and around Bangladesh Agricultural University (BAU)

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**A total number of 15 milk samples and 20 beef meat samples were studied for detecting bacterial loads and some food borne pathogens in retail outlets of Mymensingh Sadar Upazilla and in /and around Bangladesh Agricultural University (BAU), Mymensingh. An average bacterial count detected ranged from 6.23 to 6.58 log cfu /ml in milk and 7.27 to 7.81 log cfu/g in beef meat samples. *Staphylococcus* sp. was presumptively identified in 86.67% and 90% of milk and beef meat samples, respectively. No sample was positive for *E. coli* or *Salmonella*. The high load of bacteria in different milk and beef meat samples may be due to unskilled, disorganized and unhygienic milking, slaughtering and processing practices.**

Milk is a nutritious food for human beings but is highly perishable and supports heavy growth of almost all kinds of bacteria. In Bangladesh, milk is produced mostly in disorganized way and usually being supplied to the consumers from the urban and rural areas by local milk collectors. Raw milks may get contaminated with a diverse group of bacteria from the udder, body of the cows, litter, floor, flies, insects and rodents, water supply, milkers hand, milk utensils and atmosphere etc. Milk and milk products derived from milk of dairy cows can harbor a variety of microorganism and can be important sources of food borne pathogens<sup>1</sup>.

The hygienic aspect of production, supply, storage, and wholesomeness of meat is an important issue to the consumers. Meat may frequently be contaminated with a diverse group of microorganism during slaughtering, handling and processing. Microorganisms present in meat may be harmful for human health (pathogens) and may cause spoilage and may be used as indicator organisms. Many researchers have isolated and identified heterogeneous types of microflora from fresh meat. Members of the genus *Salmonella*, *Yersinia enterocolitica*, *Clostridium botulinum*, *Staphylococcus aureus*, *Bacillus cereus* etc. causes meat borne intoxication<sup>2</sup>. Spoilage of raw meat in air is caused chiefly by the growth and metabolic activity of aerobic organisms like *Pseudomonas*, *Bacillus*, *Staphylococcus*, *Micrococcus* etc<sup>2</sup>.

The samples were collected from different markets and villages of Mymensingh Sadar Upazilla and in and around the BAU campus during the period of July-August, 2008.

About 250 ml of raw milk from each sample was selected for test. Individual sample was processed following procedures

described by International Standardization organization (ISO)<sup>3</sup>. Meat samples were also prepared according to the recommendation of ISO<sup>3</sup>.

The total viable count was performed according to ISO<sup>3</sup>. The results of the total bacterial count were expressed as the number of organism or colony forming units per gram (CFU/g) or per ml (CFU/ml) of sample.

The bacteria from the mentioned samples were isolated and identified based on Morphology (size, shape, and arrangement) by Gram's staining reaction, Colony characteristics on different media like Nutrient agar, Blood agar, MacConkey agar, SS agar, TSI agar slant, Blood agar; Biochemical reactions, Hemolytic activity, Catalase test, Coagulase test and Motility test<sup>4-6</sup>. Total viable bacterial counts in milk and in beef meat samples are listed in Table 1.

The mean values of TVC per ml of milk sample collected from Digarkanda, Paglabazar and Boira were found log 6.23, log 6.58 and log 6.30, respectively. From this study it has been found that there was no significant difference ( $P>0.05$ ) between the mean values of TVC of the milk samples collected from Digarkanda, Boira and Paglabazar. This is may be due to employment of similar hygienic management practices during lactation. But, the mean TVC was found comparatively higher in milk samples collected from Paglabazar which correlated the findings of Khan (2007)<sup>7</sup> where highest TVC value in milk log cfu 6.127/ml of samples collected from Paglabazar. Marutiram and Singh (1969)<sup>8</sup> also studied the bacteriological quality of raw milk collected from cooperative union, Dairy Institute and Military Dairy Farm of

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**Table 1.** Total viable count of milk and beef meat samples collected from different locations in and around the BAU campus

No. of sample	TVC/ml of milk	Sig. level	TVC/ml of meat samples	Sig. level			
	Digan- kanda bazar	Pagla- Boira	Kewat- Shes- -khali mor	Suti- khali market	K.R.		
1	5.98	6.01	5.99	7.17	7.14	7.17	6.98
2	5.94	5.99	6.13	7.16	7.12	7.15	6.96
3	5.97	6.72	6.13	8.72	8.67	8.77	6.93
4	6.65	6.68	6.59	8.02	7.13	7.98	7.74
5	6.63	7.51	6.68	7.05	7.77	7.96	7.76
Mean ± SD	6.23 ± 0.37	6.58 ± 0.63	6.30 ± 0.31	7.62 ± 0.73	7.57 ± 0.68	7.81 ± 0.67	7.27 ± 0.43
		NS		F = 0.813			NS
				0.73			F = 0.60

All counts are expressed in logarithms

Alalabad in India and found that the total bacterial count were 9.17, 1.74 and 0.02 million per ml respectively. Similar results were also reported from other studies<sup>10-11</sup>. The percentage distribution of *Bacillus*, *Staphylococcus* and non-specific organism in this study were found 80%, 86.67% and 13.33%, respectively which conforms to the findings of Kivaria *et al.*, (2006)<sup>12</sup> who found the percentage distribution of *Staphylococcus* sp. and *Bacillus* sp. as 6.3% and 6.3% respectively.

The mean values of TVC per gram of meat samples collected from Kewatkhali, Shesmor, Sutiakhali and K.R. market were found 7.62, 7.57, 7.81 and 7.27 log cfu/ml respectively. The value was found highest in meat samples collected from Sutiakhali. This may thought to be due to differences in management and hygienic practices. The lower mean value of TVC was found in K.R. market. These findings revealed that the processing of meat was relatively better in K.R. market in respect of sanitation and handling system. The butchers were generally skilled and the consumers were well conscious about risk factors and hazardous elements associated with meat production and handling. On the contrary, in Sutiakhali market the butchers are unskilled and illiterate and consumers did not hesitate to purchase such quality of meat. The results obtained are in close agreement with the findings of Rahman *et al.*, (1979)<sup>13</sup> and Mukhopadhyay *et al.*, (1998)<sup>14</sup>. The observation revealed that there was no significant difference ( $P > 0.05$ ) between the mean values of TVC of meat samples collected from different locations. The percentage distribution of *Bacillus*, *Staphylococcus* and non-specific organisms were found 80%, 90% and 25%, which conforms to the findings of Rahman *et al.*, (1979)<sup>13</sup> and Nazmul (2008)<sup>15</sup>. There was no *Salmonella* or *E. coli* identified among the isolates. TVC of the meat samples obtained in the present study were a remarkable increase than the range as prescribed by International Commission for the Microbiological Specification of Foods. Hassall (1995)<sup>16</sup> similarly led to the opinion that meat production in Bangladesh takes place in very disorganized way, but due to non availability of cold chain system the product is sold and consumed without delay, as a result of massive contamination if there is, can not enhance meat deterioration and the threat which may arise can not endanger the health of consumers.

## References

- Oliver SP, Jayarao BM and Almeida RA. 2005. Food borne pathogen in milk and the dairy farm environment: food safety and public health implication. *Food borne Path. Dis.*, 2(2): 115-29.
- Frazier WC. 1967. Contamination, preservation and spoilage of fish and other sea foods. *Food Microbiol.*, 2<sup>nd</sup> edn. Pp 283-295.
- ISO. 1995. Recommendation of the meeting of the subcommittee, International Organisation for Standardisation, on meat and meat products. ISO/TC 36/Sc-6. The Netherlands, pp 10-18.
- Wilson ME, Weisburd MH, Mizer HE and Morello JA. 1979. *Laboratory Manual and work Book in Microbiology*. 2<sup>nd</sup> edn. Macmillan publishing co. Inc. New York, pp 102-145.
- Cowan, ST. 1985. Cowan and Steel's manual for identification of medical bacteria. 2<sup>nd</sup> edn. Cambridge University Press, Cambridge, London. pp 138-139.
- Carter, GR. 1986. Essential of veterinary bacteriological and mycology (3<sup>rd</sup> edn.). Lea and Febiger, 60 Wasington Square, Philadelphia, Wasington, D. C, pp 160-183.
- Khan MTG. 2007. Study on physical and biochemical qualities of raw milk collected from BAU dairy farm and the surrounding villages. MS thesis, submitted to the Department of Microbiology and Hygiene, BAU, Mymensingh.
- Ikonomov, L.; Lotov, I.; Todorov, D.; Tankov, G. and Dzhurov, TS. 1956. Bacteriological studies of Hygiene of milk production of Bulgarian cattle Breeding Farms. *Dairy Sci. Abstr.*, 19: 936.
- Marutiram, B. and Singh, SP. 1969. Studies in Bacteriological quality of milk. *Indian J. of Dairy Sci.*, 21(1): 103-111.
- Reichart, H. 1982. Satisfactory raw milk quality as a condition for increased sales of milk and milk products. *Dairy Sci. Abstr.* 45(12): 922.
- Lee, JT, Park SY, Lorea IK and Kin HU. 1983. Quality of raw milk in Korea. *Korean J. of Dairy Sci.*, 5(1): 22-28.
- Kivaria, FM.; Noordhuizen, JP and Kapaga, AM. 2006. Evaluation of the hygienic quality and associated public health hazards of raw milk marketed by small holder dairy producers in the Dar es Salaam region, Tanzania. *Trop. Animal Health Prod.* 38(3): 185-94.
- Rahman, MA.; Choudhury, TM. and Rahman, MM. 1979. Microbial contamination of meat and their public health significance. *Veterinary J. of Bangladesh.* 13(1-2): 1-7.
- Mukhopadhyay HK, Puvajaran B and Dorairajan N. 1998. Detection of microbial load in fresh mutton and its impact on public health. *Indian J. of Ani. Health.* 37: 81-83.

15. Nazmul Haque, 2008. Determination of bacterial load and public health significance of some selected market beef sold in sadar upazilla under Mymensingh district. M.S. thesis, submitted to the Department of Microbiology and Hygiene, BAU, Mymensingh.
16. Hassall and associate Pte. Ltd. 1995. Bangladesh third livestock development project Vol. 2. Meat Processing and Marketing Sector, Annexure 1, pp 146.