Foot and Mouth Disease in Baghabari Milk Shed Area and It’s Economic Loss in Bangladesh

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Abstract: The study was carried out during and after an outbreak of foot and mouth disease (FMD) in Baghabari milk shed area, Sirajgonj, Bangladesh for a period of one year. Results showed that the incidence of FMD varied significantly (p<0.01) in different host species with higher incidence in cattle (63.41%) followed by sheep/goats (50.96%) and buffaloes (48.02%). Among cattle, FMD was found to occur significantly (p<0.01) higher in cows (68.01%) than in bulls/bullocks (60.69%) and calves (56.02%). A total of 125 (9.71%) calves died of FMD and the financial loss incurred from this mortality was estimated to be US$ 6250 (@ US$ 50/calf). The economic losses due to calf mortality, reduced milk yield and draft power would stand at US$ 163,329 for cattle alone. Losses incurred from draft power cattle ranged from 10.5-15.5 kilo-watt hour. The FMD virus types were identified as Asia, and O by examining 32 tongue epithelial samples adopting complement fixation test (CFT).

Key words: FMD virus, incidence, milk-shed area, economic loss

INTRODUCTION

Foot and mouth disease (FMD) is an epizootic viral disease affecting the cattle, buffaloes, sheep and goats for several centuries[1]. The causal agent was one of the first characterized viruses[2]. It remains one of the most economically important virus diseases of farm animals that causes a substantial reduction in productivity[3]. It is a highly contagious disease that causes severe economic loss in terms of cattle mortality and reduced productivity of the affected animals. The occurrence of the disease in draft cattle during land preparation has been contributing to a lot of sufferings of the farmers that lowers crop production in the locality. The types of FMD virus in Bangladesh were reported as types A, O, C, Asia, and sub-type A[2][3]. The losses due to FMD of draft cattle in Mymensingh district of Bangladesh were quantified by Rahman et al.[4]. The determination of economic losses that incurred from this disease in milk shed area would help in precise disease control planning by the farmers and government as well. However, no literature was available on economic losses due to FMD in Baghabari milk shed area. This study describes an outbreak of FMD in domestic animals including cattle, buffaloes and sheep/goats and the types and sub-types of virus found during the outbreak and the economic losses due to this malady in Baghabari milk shed area.

MATERIALS AND METHODS

The study was conducted during and after an outbreak of FMD in Baghabari milk shed area from January-December, 1999. The incidence of FMD in cattle, sheep/goats and buffaloes and economic losses incurred from calf mortality, reduced milk yield and draft losses were recorded by interviewing the owners using a questionnaire. All the data were analyzed using SAS (Statistical Analytical System) package at Bangladesh Livestock Research Institute Computer Center[4] by General Linear Model Procedure. Comparison based on least significant difference at p=0.05 were done between the means of different species and age groups of animals.

The infection rate was analyzed using Chi-square (p<0.05). Tongue epithelia from the affected animals were collected and preserved in 50% glycerin phosphate buffer solution and kept in the flasks containing ice which were transported to the Bangladesh Livestock Research Institute laboratory that were preserved at 20°C until they were analyzed. The collected tongue epithelia were ground using pestle and mortar in phosphate buffer saline (PBS) and used as test antigen after being centrifuged at 3000 rpm for 10 min. Pooled sera collected from a number of male guinea pigs were used as complement. Specific antisera against types A, O, C, Asia, A[3] and A[4] that obtained from the World Reference Laboratory, Pirbright.
United Kingdom were used as test antibody. Microcomplement fixation test (CFT) was done for typing and sub-typing of the viruses, respectively, following the procedure of Formant[1] and Pereira[10].

RESULTS AND DISCUSSION

Incidence of FMD in different species of hosts and various age groups of cattle in an outbreak in Baghbari milk shed area was shown in Table 1. Of the total 6147 animals observed in the milk-shed area, 4845 were cattle, 938 sheep/goats and 329 buffaloes. Incidence of FMD varied significantly (p<0.01) in different host species with higher incidence in cattle (63.41%) followed by sheep/goats (50.96%) and buffaloes (48.02%) which were in agreement with the findings of Rahman et al.[7]. Nevertheless, the incidence in a specific animal species was higher than the findings of Rahman et al.[3]. Among cattle, FMD was found significantly (p<0.01) higher in cows (68.01%) than in bull/bullocks (60.09%) and calves (56.02%) (Table 1). The rate of infection among different groups of cattle confirmed the findings of Plotnikov[12] and Rahman et al.[7]. The indiscriminate movement of the animals from place to place for generating draft power could be attributed to the main reason of quick spread of the disease in the area.

Out of 1287 FMD affected calves, 125 (9.71%) died and the economic loss incurred from the calf mortality alone was estimated to be US$ 6250 (@ US $ 50/calf) (Table 2). Rahman et al.[7] found 49.5% calf mortality due to FMD which was higher than the present findings. Lower calf mortality that was observed in the present study might be due to the treatment that was provided to the FMD affected calves with antibiotics and sulphonamides in order to prevent the secondary bacterial infections, as the farmers of Baghbari milk shed area have been experiencing the trends of calf mortality from FMD in recent years[4,7]. Cattle were found to be suffered from FMD for a period of 15-20 days with an average of 18.8 days. While the working cattle kept abstained from work for a period of 14-28 days with an average of 20.5 days. The loss of draft power ranged from 10.5-15.5 kilo-watt hour which were calculated using a 4 h working period per day for each cattle and 0.2-0.3 horse power working energy per cattle[10]. The diseased period, losses during working days and losses from draft power for each FMD affected cattle were found to be inconsistent with the findings of Rahman et al.[7]. A total of 32718 ploughs were found to be lost during 20.5 days working period and 3210 ploughs were found to be hired to plough the land that was required to cultivate and prepare by using the draft animals, while they were not affected by FMD. The value of the ploughs was estimated to be US$ 89820 based on US$ 2.5 for each plough. The losses incurred from 134518 L of reduced milk yield during and after infection period and mortality of 125 calves were estimated to be US$ 67259 (@ US$ 0.5/L) and US$ 6250.0 (@ US$ 50/calf), respectively. Thus, the total loss on account of calf mortality, reduced milk yield and draft power in Baghbari milk shed area would stand at US$ 163329. The farmers in Baghbari milk shed area would profit much if they could readily know the types and strains of the FMD viruses that affect their livestock.

In the present study, a total of 32 field virus samples were tested by complement fixation test (CFT) of which 12 were found positive with Asia, and 15 with type O and the rest 5 were either negative or anticomplementary. Previous typings have shown that Baghbari milk shed area has virus type O[6,7]. The emergence of new types in this area could be attributed to mutagenic change of the virus and to extensive movement of animals for different purposes. The typing and sub-typing of this FMD virus in the field would help the vaccine production laboratory in Bangladesh as a guide line for the production of effective and low cost vaccines against the specific type and sub-type of virus that would substantially reduce the economic loss from FMD.

ACKNOWLEDGMENTS

We thank the Director General of Bangladesh Livestock Research Institute, Savar, Dhaka, Bangladesh for his advice and cooperation during the conduct of the
research. We also acknowledge the help of Dr. Bijon Kumar Sil, Principal Scientific Officer of Bangladesh Livestock Research Institute, Savar, Dhaka, Bangladesh for his cordial support during the laboratory analysis of FMD samples.

REFERENCES