



Analysis of foot and mouth disease in dairy animals: an assessment of cost and loss from sample farmers

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ABSTRACT

Response from 60-farm owners was analyzed to assess the economic impacts of foot and mouth disease. Data were recorded through personal interview methods during 2006-07 from small farmers across the villages of Pune region. The loss in terms of reduced revenues and cost as extra resources used for treatment were quantified and aggregated. The estimated production loss to the tune of Rs. 3184.00 in crossbreeds cows and Rs. 3062.50 in buffaloes, whose share was 74.31 and 81.69 per cent, respectively. The major loss component was reduction in milk yield, accounted Rs. 894.60 and Rs.510.00, represents 20.88 and 13.60 per cent of the total loss in crossbred cows and buffaloes, respectively. The cost of treatment was worked out to be Rs. 1313.80 in crossbred cows and Rs. 645.63 in buffaloes. The cost of medicine alone had constituted around 50 percent of total cost component, reflecting a tune of Rs. 675.60 in crossbred and Rs. 281.25 in buffaloes. The expenses were worked out to be Rs. 5598.80 in crossbred and Rs. 4394.38 in buffaloes per animal, which shows the expenses due to the disease, was comparatively higher in the crossbred cows. Movement of animals was ascertained to be the reason for spread of this disease in 80 per cent farm perception.

Key words: Cost, Dairy animals disease, Production loss.

INTRODUCTION

Animal husbandry played an important role in national economy and multifaceted contributions to the livelihood of over 100 million rural people (Bhatt, 2012), mainly vulnerable groups of small and marginal farmers. India accounts 56 percent buffalo and 14 per cent of the cattle population of world (Census, 2012) and contributing 25.6 per cent to the gross domestic product from agriculture and allied activities (Economic Survey, 2012-13). It has excellent forward and backward linkages, which promotes many industries and increase in income of vulnerable groups of agricultural labor and marginal farmers (Sinha *et al* 2012, Sinha and Meena, 2014). However, regular outbreaks of livestock disease, particularly foot and mouth disease (FMD), limits the farm potential and animal productivity (Sinha *et al*, 2017). Estimates of the impacts suggesting some annual loss up to US\$ 5 billion as occur in India alone (Venkatramanan *et al*, 2007). Thus, the growth of this sector is being threatened by the emergence of such a deadly animal disease (Thombare and Sinha, 2009). The consequences are immediately visible in the form of death, abortion and obscured effects like reduced yield, reduced working capacity. This not only creates havoc on

existing livestock but also essentially prevents international trade altogether. Species wise indigenous cows suffer the most with a reduction of 37.6 per cent in its attainable output followed by buffaloes and cross breed cows (Brithal and Jha, 2005). A better understanding of economics and its implications will not only help to read actual situation, but also will help how to limit the losses and risk of the disease to a minimum level. Hence, study were taken to assess the impacts of foot and mouth disease on farm production and farmers economy in the state of Maharashtra.

MATERIALS AND METHODS

Pune region of Maharashtra, which is the highest milk producing center in the state and has better cross bred animal population, which are more prone to the disease than the native bred animals have been purposively chosen for the study. A sum of 60-farm owners' response was recorded across village in the region to assess the status and impacts of FMD. The loss in terms of reduced revenues and cost as extra resources used for treatment were quantified and aggregated. The costs are the expenditure estimated made as per standard treatment, prevention and extra labour used for the disease. For the estimation of losses due to FMD, data related to animal infected, days of illness, reduction in yield and market value,

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Table 1: Age and education status of farm respondents

	Age group		Level	Literacy status	
	N=60	Percent (%)		N=60	Percent (%)
Young (<30)	5	8.48	Illiterate	2	3.33
Middle (30-50)	49	81.03	Primary	41	68.34
Old (>50)	6	10.49	High school	17	28.33
Total	60	100.00	Total	60	100.00

Table 2: Feeding system and housing structure of farm respondents

	Housing structure			Feeding system	
	N=60	Percent (%)		N=60	Percent (%)
Katcha	28	46.67	Grazing	1	1.67
Pucca	27	45.00	Stall fed	53	88.33
No Shed	5	8.33	Mixed	6	10.00
Total	60	100.00	Total	60	100.00

price of hide/skin, working capacity were collected by personal interview method. Market value of dead animals and losses due to abortion was also taken into account. The losses were calculated for individual affected animals. To find out the costs incurred to treat the disease, cost of medicine, days of treatment, extra labor used, and veterinary services were also recorded with consulting veterinarian and the farm owners.

RESULTS AND DISCUSSION

Farmer's status and profile: Social attributes of farm respondents like age, education, status and wisdom play an important role in farm decision linked with his level of maturity, physical well being, work efficiency and the farm productivity. In the present study, majority (81%) of them were between the middle age groups of 30 to 50 years of age (Table 1). Moreover, the 97 per cent of our respondents having cattle and buffaloes were some way literate, having primary school as well as high school education. Study suggests that education can be well correlated with the level of awareness to disease outbreaks and educated farmers were more likely to seek professional advice and to vaccinate their animals in time regularly (Saini *et al.* (1992).

Further, it is clear from Table 2 that only 27 out of 60 were maintaining pucca houses for their animal and rest was having either kaccha shed or no shed. At the same time, they were able to maintain stall-fed feeding system, which reflect farmer's deep root with crop production and related activities to maintain their dairy and farm animals.

Rate of infection and mortality: The incidence and mortality rate were worked out by dividing the total number of animals affected by the total number of animals available in the farm. Out of 174 dairy animals of crossbred and buffalo, 128 animals

(115 crossbred and 13 buffaloes) were found to be affected with FMD. The morbidity/infection rate was imputed high as 73.87% (Table 3) in the study area. Most of the animals were vaccinated only before the onset of the disease. Infection in animal may also be attributed to the transportation route of sugar cane factory, where infected animal coming across from the neighbouring district as perceived by farmers. Therefore, there is scope for bringing down the incidence of the disease by mass vaccination in the study area. However, mortality rate was found to be very less (0.5 per cent) as compared with the morbidity rate.

Losses due to FMD: For estimating loss per animal, the reduced output/value was multiplied by average market price during the outbreak (Table 4). The major share of the loss in case of crossbred cow and buffaloes was due to the reduction in the market value of the animal after the disease. This is because in crossbred animals, the appearance of the animal changes drastically after the illness. This was found out to be Rs. 3184.00 in crossbreed cows and Rs. 3062.50 in buffaloes, whose share was 74.31 and 81.69 per cent, respectively out of the total loss reported per animal in sample respondents. The next major part of loss was due to the reduction in the milk yield due to the disease in both crossbred cows and buffaloes that was accounted Rs. 894.60 (20.88%) and Rs 510.00 (13.60%), respectively. The next about 5 percent loss was due to reduction in hide and skin values as estimated. Saxena (2004a) made an annual loss estimate in terms of milk production and abortion caused by FMD as the losses per year were 3,508 million litres of milk, which is approximately 6.5 per cent of the total annual national milk output. In terms of value, the annual loss of milk was Rs12, 520 million in terms of lost foreign exchange at 1990 prices,

Table 3: Incidence and Mortality rate of foot and mouth disease

Species	No. of animals infected	Animals died	Total farm animals	Morbidity rate	Mortality rate
Cross breed	115	1	156	73.72	0.64
Buffaloes	13	0	18	72.22	0
Total	128	1	174	73.87	0.50

Table 4: Losses due to FMD in Rupees

Kind of animal	Reduction in milk yield	Reduction in market value	Reduction in hide and skin	Total loss
Cross bred cow	894.60(20.88)	3184.00(74.30)	206.40(4.82)	4285.00(100.00)
Buffalo	510.00(13.60)	3062.50(81.70)	176.25(4.70)	3748.75(100.00)

Figures in parentheses indicate percentage to the total loss

Table 5: Cost incurred in FMD in Rupees

Cost components	Farm Animals	
	Cross bred cow	Buffalo
Medicine charges	675.60 (51.42)	281.25 (43.56)
Vet. charges	125.20 (9.53)	85.00 (13.17)
Labour charges	116.40 (8.86)	75.63 (11.71)
Disinfectant charges	87.20 (6.64)	61.88 (9.58)
Infertility charges	269.60 (20.52)	111.25 (17.23)
Miscellaneous cost	39.80 (3.03)	30.63 (4.74)
Total cost components	1313.80 (100.00)	645.63 (100.00)

Figures in parentheses indicate percentages to the total cost components

and between Rs16,500 million and Rs18,730 million in terms of lost domestic economic surplus. In a further study, Saxena (2004b) estimated the losses due to lost draught power, animal deaths and costs of treatment at Rs18,130 million. On an average, annual losses per head of cattle and buffalo in the country were estimated at Rs. 125.

Cost incurred in FMD: To compute the cost components incurred for treating diseased animal, medicine cost, veterinary service charges, extra labour used, disinfectant and infertility costs included Table 5. Farmers used various disinfectants to clean the animal premises and to clean the animal wounds and this was included in the disinfectant costs. Mostly the farmers used potassium permanganate to clean the wound. In most of the animals the reproductive failure has been noticed as the after effect of the disease and the cost utilized for correcting the reproductive failure was included in infertility costs. Further in the study area there was a belief that banana soaked in lard would help in healing process and this was included as the miscellaneous cost. Since during the course of the disease animal could not take feed because of the high fever and ulcers, this may act as a source of energy to the animals.

The treatment cost was higher in case of crossbred cows than buffaloes. The major portion of cost was due to the medicine cost followed by infertility charges in both categories of animals. These two components had caused 60-70 per cent of the cost. From the table it could be noted that total cost incurred to treat FMD was found out to be Rs. 1313.80 in crossbred cows and Rs. 645.63 in buffaloes. Medicine cost alone had constituted around 50 percent of total cost, reflecting a sum of Rs. 675.60 in crossbred and Rs. 281.25 in buffaloes. Next to medicine charges, the infertility charges were found out to be major cost item. The animals affected with FMD lose weight and their milk yields drop, which renders them as an economic liability for farmers and the after effects of the disease was dreadful. Most of the study farmers spent a lump sum money to treat the infertility

resulted from the infection. In crossbred cows it was found out to be Rs. 269.60 and Rs. 111.25 in buffaloes and the share was found out to be 20.52 and 17.23 per cent out of the total cost, respectively. Next to the infertility charges, veterinary charges were found out to be major cost item. In crossbred cows veterinary charges were found out to be Rs. 125.00. Its share was found out to be 9.53 per cent out of the total cost. In buffaloes, the veterinary charges were found out to be Rs. 85, whose share was 13.17 per cent out of the total cost respectively.

The total expenses due to FMD were worked out to be Rs. 5598.80 in crossbred and Rs. 4394.38 in buffaloes per animal, shows the expenses due to the disease was comparatively higher in the crossbred cows. The trend was in the line of previous study done by Prabu *et al.* (2004), where total expenses estimated as Rs. 1793.34 and Rs. 2049.09 in crossbred cows and Rs. 1156.90 and Rs. 1548.10 in buffaloes among vaccinated and unvaccinated animals, respectively.

Spread factor ranked by owners : Respondents in the survey were asked to rank the perceived factors responsible to spread endemic diseases in order of severity and economic importance. This question was intended to assess producers' perceptions and significance of diseases (Table 6). Overall, FMD was rated the most important disease. Only 3.13% of respondents rated low literacy and unawareness to be the reason of spread. While over 80 per cent owners' perception was the animal movement from place to place was the main culprit for spread.

Table 6: Factors responsible for spread of diseases

Factors responsible for spread of diseases	Percentage (%)
Sanitation and hygiene	3.13
Non availability of vaccination	9.38
Non available Veterinary services	3.13
Awareness and Literacy	3.13
Marketing & trading of animal	15.63
Movement of the animals	65.63

The perception of the farmer also tallies with report of Disease Investigation Section, 2007 Govt. of Maharashtra that out of 104 outbreaks prevailed 95 outbreaks of FMD were reported from the district in which the sugar factories are located. It can be inferred that movement of animals used for transport of sugarcane may be one of the important reason in spread of the disease.

CONCLUSION

FMD in dairy animal is an important disease in terms of its economic impact. It cause greatest production loss to the tune Rs. 3184.00 in crossbred cows and Rs. 3062.50 in buffaloes, whose share was 74.31 and 81.69 per cent,

respectively among the respondents at farm level. Reduction in milk yield was reported as major components followed by treatment cost, found out to be Rs. 1313.80 in crossbred cows and Rs. 645.63 in buffaloes. Among treatment, medicine cost alone had constituted around 50 percent, reflecting a sum of Rs. 675.60 in cross bred and Rs. 281.25 in buffaloes. The expenses incurred in crossbred cows were higher (Rs.5598.80) in crossbred than in the buffaloes at Rs. 4394.38, suggesting that the high producing animals are more sensitive and prone to production diseases. Further, movement of the animal may be restricted as suggestive precautionary measure to prevent the spread of the disease.

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