

## FOOT AND MOUTH DISEASE OUTBREAKS AFTER THE LAUNCH OF FMD CONTROL PROGRAMME IN HARYANA

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### ABSTRACT

The present paper describes epidemiological studies on foot and mouth disease (FMD) and its virus types distribution in Haryana during the years 2005 and 2006 after launch of FMD control programme in the state through mass vaccination of all the susceptible animals w.e.f. January 2004 onwards. Only four FMD outbreaks (three in 2005 and one in 2006) were recorded between January 2005 and December 2006 from four districts of Haryana. Eleven clinical samples were collected and analyzed for FMD virus types O, A, C and Asia1 using Sandwich ELISA. Of these, 10 were typed as belonging to FMD virus type O and one as Asia1. FMD virus type O was the most predominant type, whereas, FMD virus type A and C failed to show their existence during these two years. Each of the four outbreaks was investigated under intensive epidemiological studies.

**Key words:** Foot and mouth disease, outbreaks, epidemiology, Haryana, virus type distribution

Foot and mouth disease control programme (FMD-CP) has been launched during X<sup>th</sup> five year plan in January 2004 in eight districts of Haryana viz.: Bhiwani, Fatehabad, Hisar, Jhajjar, Jind, Rohtak, Sirsa, and Sonapat by Department of Animal Husbandry and Dairying, Government of Haryana. Remaining 11 districts have also been covered through centre's funding under 'Assistance to States for Control of Animal Diseases' (ASCAD) programme. Regular mass vaccination of susceptible animals had been done approximately at six months' interval in districts under FMD-CP and annually under ASCAD. The Regional Research Centre on Foot and Mouth Disease (RRC on FMD), Department of Veterinary Microbiology carried out regular surveillance on FMD outbreaks in all the 19 districts of Haryana. The FMD outbreaks in Haryana have previously been reported during years 1996 (Maan *et al.*, 1998), 1997-2000 (Sharma *et al.*, 2006), 2001 (Sharma *et al.*, 2002), 2002 (Kakker and Sharma, 2003) and 2003-04 (Sharma and Kakker, 2005). Present communication describes the occurrence of FMD outbreaks in Haryana between January 2005 and December 2006 after the launch of FMD-CP.

### MATERIALS AND METHODS

Surveillance for FMD outbreaks was continued throughout Haryana and epidemiological data for each outbreak was recorded from all the 19 districts as described in earlier communications (Sharma *et al.*, 2002, Kakker and Sharma, 2003, Sharma and Kakker, 2005). The typing reagents were supplied by the Central FMD Virus Typing Laboratory of the Project Directorate on FMD. Sero-typing of the FMD virus was done from the clinical samples by Sandwich ELISA as per the standard protocol (Bhattacharya *et al.*, 1996). The clinical samples, which could not be typed, were amplified in baby hamster kidney-21 (BHK-21) cell culture system (Sharma *et al.*, 1985) and the virus, after amplification was again put to ELISA.

### RESULTS AND DISCUSSION

During January 2005 to December 2006, four FMD outbreaks were recorded (January 2005 (2), March 2005 (1) and one in February 2006) in the state of Haryana. The total number of animals at risk, animals affected, animals died and case attack rate per 1000 animals during

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each FMD outbreak has been depicted in the Table. Similar observations were recorded previously where no FMD outbreak was encountered in the months of April to December 2004, whereas 15 outbreaks were recorded in January (7), February (6) and March 2004 (2) (Sharma and Kakker, 2005). This may perhaps be because of the mass vaccination of susceptible animals through FMD-CP in Haryana. In contrast, during the year 2003, FMD outbreaks were recorded throughout the year, even in the summer months, whereas no outbreak was recorded between June–September 2002 (Kakker and Sharma, 2003). The number of outbreaks recorded during the earlier years were 111 in 2003 (Sharma and Kakker, 2005) 26 in 2002 (Kakker and Sharma, 2003), and 52 in 2001 (Sharma *et al.*, 2002).

The FMD outbreaks were recorded only in four of the 19 districts (Ambala, Gurgaon, Rewari and Sirsa) of Haryana involving both cattle and buffaloes simultaneously. A total of 11 samples were collected from these outbreaks and virus was successfully identified from all the samples using Sandwich ELISA. Only two virus types were recorded viz: type O (10) and Asia1 (1). Like in previous years, the FMD virus type O predominated over other types (Maan *et al.*, 1998, Sharma *et al.*, 2002, 2006, Kakker and Sharma, 2003, Sharma and Kakker, 2005). In outbreaks of 1976 and 1984, FMD virus type ‘Asia 1’ was the predominant type (Prasad *et*

*al.*, 1978, Ahuja *et al.*, 1986, Mann *et al.*, 1998, Sharma *et al.*, 2002, Kakker and Sharma, 2003). The predominance of FMD virus type ‘O’ has also been demonstrated in north-eastern states and other part of India (Sen and Saha, 1992, Barman *et al.*, 1999). The FMD virus types A and C were not recorded during these years. The intensive epidemiological studies undertaken to investigate these four FMD outbreaks as under:

**i) FMD outbreak in district Ambala (January 2005):** The Ambala district is not covered under FMD-CP but vaccination is being annually done under ASCAD programme. The affected village (bordering Himachal Pradesh) is located about 5 Km away from Chandigarh–Ambala National Highway and had a total population of 458 animals comprising 144 cattle, 296 buffaloes and 18 goats. The animals in this particular village were not vaccinated. Of the 458 animals, a total of 11 (2.4%) animals (cattle 7 and buffaloes 4) went down with the disease. The duration of the FMD outbreak was 6 days. No mortality was recorded and the morbidity rate was also low (2.5%). FMD virus type Asia1 was isolated from the affected animals. No FMD case was detected from the immediate surrounding villages. The FMD team suggested ring vaccination to the susceptible animals in the immediate vicinity of the outbreak. Subsequent visit to the area confirmed the containment of the outbreak only to the affected village and no single case was reported beyond 6 days of the outbreak. During the past three years, FMD outbreaks were recorded in the surrounding three villages (March 2002, January and February 2003) and involved FMD virus type O. It is an established fact that in case of FMD, the animals that have recovered from infection of one serotype remain fully susceptible to infection with other serotypes (Murphy *et al.*, 1999).

**ii) FMD outbreak in district Rewari (January 2005):** The Rewari district is also not covered under FMD-CP and the animals in this particular village were left out during annual vaccination under ASCAD programme. The affected village is located about 3 kms away from Delhi – Jaipur National Highway No. 8 (bordering Rajasthan) and has 5336 animals comprising 2786 buffaloes,

**Table**  
**Month-wise distribution of FMD outbreaks between January 2005 and December 2006**

Month	No. of outbreaks	No. of Animals			Case attack rate per 1000
		At risk	Affected	Died	
Jan. 2005	2	3994	92	18	23
Feb. 2005	-	-	-	-	-
March 2005	1	3767	10	-	3
April–Dec. 2005	-	-	-	-	-
Jan. 2006	-	-	-	-	-
Feb. 2006	1	1413	138	32	97
March–Dec. 2006	-	-	-	-	-
Total	4	9174	240	50	26.16

382 cattle, 820 sheep, 1198 goats and 150 pigs. Further, the village is on a major migratory route of animals between Rajasthan and Delhi. Of the 5336 animals, a total of 81 (1.51%) animals (cattle 16 and buffaloes 55) went down with the disease. The duration of the FMD outbreak was 12 days and the number of animals died were 18 (cattle 4 and buffaloes 14). FMD virus type O was isolated from the affected animals. The probable cause of FMD outbreak in this case may be attributed to the infected animals from the neighboring state transmitting the FMD virus during transit through the Rewari. Further investigations of this outbreak revealed that these animals were also suffering from hemorrhagic septicemia (HS). The mortality may, thus be attributed to the combined outbreak of FMD and HS. Earlier during the year 2003 – 2004 also, combined outbreaks of FMD with HS were recorded in Bhiwani, Hisar, Rohtak and Yamuna Nagar (Anon, 2004). The FMD team suggested ring vaccination of the susceptible animals in the immediate vicinity of the outbreak and treating animals for HS. Subsequent visit to the area confirmed the containment of the outbreak only to the affected village and no single case was reported beyond 12 days of the outbreak.

**iii) FMD outbreak in district Sirsa (March 2005):** The Sirsa district is covered under FMD-CP and 1700 FMD vaccine doses were utilized in this particular village only three days back of the FMD outbreak. This village near Rajasthan border is not located on any National Highway but is on a migratory route of animals between the state of Rajasthan and Delhi. The affected village had 3535 animals comprising 2098 buffaloes, 487 cattle, 520 sheep, 136 goats and 294 camels. Of 3535 animals, a total of 10 (0.28%) animals (cattle 2 and buffaloes 8) went down with the disease. FMD virus type O was isolated from the affected animals. No mortality was recorded and the morbidity rate (0.2%) was also very low. The low morbidity observed in the present outbreak may presumably be due to the mass vaccination of animals under FMD-CP launched by Govt. of Haryana. Our earlier studies undertaken on sero-monitoring of mass FMD vaccination in a villages in Hisar District during 1999-2001 demonstrated that vaccinated

animals had not contracted the infection in the event of FMD outbreak in the neighboring villages (Anon, 2000, 2001). Six serum samples were also collected in the present outbreak from the affected animals and analyzed for having protective antibody titres ( $>2.1 \log_{10}$ ) against FMD virus types O, A and Asia1 by liquid phase blocking (LPB) ELISA. Three of these animals did not show protective antibody titres against any of the three FMD virus types, however, two animals demonstrated protective antibody titres against FMD virus types O and A. One animal showed protective antibody titres against FMD virus types A. No FMD case could be detected from the immediate surrounding villages. The possible reason of FMD outbreak in this case may be the infected animals from the neighboring state spreading the infection during the transit period through the Sirsa. Further, there were reports of FMD outbreaks in adjoining villages of Rajasthan for which there were no clinical samples available to this Centre. Subsequent visit to the area confirmed the containment of the outbreak only to the affected village and no single case was reported beyond 5 days of the outbreak.

**iv) FMD outbreak in district Gurgaon (February 2006):** The Gurgaon district is also not covered under FMD-CP but vaccination is being annually done under ASCAD programme. The affected village is located 12 kms away from National Highway No. 8 and has 1413 animals comprising 960 buffaloes, 150 cattle, 300 goats and 3 camels. Of the total 1413 animals, a total of 138 (15 cattle and 123 buffaloes) animals (9.76%) went down with the disease. Of these 32 buffaloes (13 calves and 19 adults) died due to severity of the secondary infection with *Pasteurella multocida*. FMD virus type O was isolated from the affected animals. The duration of the FMD outbreak was 17 days. The disease was recorded in young calves, heifers and milch animals. Initially, the disease started due to migratory animals from neighboring state and subsequently spread to few unvaccinated and recently vaccinated (<14 days) animals. It is believed that low antibody titres predisposed these animals to the circulating FMD virus. The morbidity rate was

also very high (9.76%).

In conclusion, three of the four FMD outbreaks during January 2005 – December 2006 occurred in the districts (Ambala, Gurgaon and Rewari) not covered under FMD – CP and only one in the district (Sirsa) covered under FMD – CP. Further, the mortality and/ or morbidity rates in the former three FMD outbreaks were very high (morbidity rates 4.25% and mortality 0.92%). On the other hand, the mortality and/ or morbidity in the FMD outbreaks at Sirsa was very low (0.26%). The animals in all the three villages in districts Ambala, Gurgaon and Rewari were not vaccinated regularly where FMD outbreak occurred whereas the animals in Sirsa district had been vaccinated three times at an interval of six months under FMD – CP. In addition, the epidemiological studies done during January 2005 – December 2006 have shown significant reduction in FMD outbreaks which may, in turn, be attributed to the mass vaccination of susceptible livestock against FMD under ongoing FMD – CP in Haryana during X<sup>th</sup> five year plan. It is envisaged that this programme should be continued during XI<sup>th</sup> five year plan for the effective containment of the FMD in Haryana state.

### Acknowledgements

The authors wish to thank the Indian Council of Agricultural Research (ICAR), New Delhi, Project Directorate on FMD, IVRI Campus, Mukteswar-Kumaon (Uttarakhand) and CCS Haryana Agricultural University, Hisar for providing funds and facilities. The authors are also thankful to the Director General and field veterinarian of the Department of Animal Husbandry and Dairying, Govt. of Haryana for help in collecting FMD specimens. The help rendered by the laboratory staff particularly, Sh. Narendra Paul, VLDA and Chandan Singh, L. A. is also acknowledged.

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