Haryana Vet. **48** (December, 2009), pp 97-99

Short Communication

INCIDENCE OF FOOT AND MOUTH DISEASE OUTBREAKS IN HARYANA DURING THE YEARS 2007 AND 2008

R. SHARMA[1] and N. K. KAKKER
Regional Research Centre on Foot and Mouth Disease
Department of Veterinary Microbiology, College of Veterinary Sciences
CCS Haryana Agricultural University, Hisar-125 004

SUMMARY

During this period, only three foot and mouth disease (FMD) outbreaks including one in 2007 and two in 2008 were recorded in cattle from Hisar district of Haryana. Eight clinical samples were collected and analysed for FMDV serotypes O, A, C and Asia1 using sandwich ELISA. Of these, two were typed as FMD virus serotype O while six as serotype A. FMDV serotypes Asia1 and C were not reported during these two years. Each of the three outbreaks was investigated under intensive epidemiological studies. Recent upsurge in the activity of FMDV serotype A in 2008 in Haryana has been discussed in the light of phylogenetic analysis of vaccine (genotype VI) and circulating field strain (genotype VII).

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

Foot and mouth disease (FMD) is one of the most dreadful and an OIE listed viral diseases of the livestock world wide. Incidence of FMD outbreaks and distribution of FMD virus (FMDV) serotypes in Haryana has previously been reported during the years 1994-96 (Maan *et al.*, 1998), 1997-2000 (Sharma *et al.*, 2006), 2001 (Sharma *et al.*, 2002), 2002 (Kakker and Sharma, 2003), 2003-04 (Sharma and Kakker, 2005) and 2005-06 (Kakker and Sharma, 2007). The present communication describes the incidence of FMD outbreaks in Haryana between January 2007 and December 2008.

Surveillance for FMD outbreaks was continued throughout Haryana by visiting regularly all the 20 districts of the state and/or through reporting of FMD outbreaks by the field veterinarians of the Department of Animal Husbandry and Dairying, Haryana as described earlier (Kakker and Sharma, 2003, 2007, Sharma and Kakker, 2005, Sharma *et al.*, 2002). During January 2007 to December 2008, three FMD outbreaks were recorded including one in February 2007 and two in January 2008 in the state of Haryana. The epidemiological data for each of the three FMD outbreaks at village Barwala, Agroha and Azad Nagar from Hisar District was recorded in a prescribed performa supplied by the Project Directorate on FMD, IVRI Campus Mukteswar, Kumaon, Uttarakhand. Sero-typing of the FMD virus was done from eight clinical samples (Barwala-2, Agroha-4 and Azad Nagar-2) collected from three outbreaks by sandwich ELISA and virus isolated as per the standard protocol (Bhattacharya *et al.*, 1996). The clinical samples which remained untyped in sandwich ELISA were processed in baby hamster kidney-21 (BHK-21) cell culture system for amplification and isolation of the FMD virus and again subjected to serotyping as described above. The authorities were advised to re-vaccinate immediately the animals against FMD.

In addition, a total of 28 serum samples (varying number from three outbreaks) were collected during the phase of FMD outbreak (20) and one month after recovery and vaccination (8) and tested in liquid phase blocking ELISA (LPB-ELISA, Hamblin *et al.*, 1986) as described previously (Kakker and Sharma, 2008) for the detection of vaccinal antibodies against structural proteins of FMDV serotypes O, A and Asia-1. Further, 15 serum samples (varying number from three outbreaks) were also tested in 3A non-structural protein ELISA (3A NSP ELISA, Kumar *et al.*, 2007)

[1]Corresponding author

for the detection of antibodies against NSPs of FMDV as an indicator of recent infection. The typing and LPB-ELISA reagents were supplied by the Central FMD Virus Typing Laboratory of the Project Directorate on FMD, IVRI Campus Mukteswar, Kumaon, Uttarakhand. The reagents used in 3A NSP ELISA were those as described previously (Kumar *et al.*, 2007). The intensive epidemiological studies undertaken to investigate these three FMD outbreaks are as under:

FMD outbreak at village Barwala during February 2007: Of the total 4880 animals (1874 buffaloes, 1156 cattle, 1200 sheep, 300 goats and 350 pigs) three cattle (two milch and one calf) went down with the disease and FMDV serotype O was isolated from clinical samples collected from two affected animals. The duration of the FMD outbreak was for five days. In LPB-ELISA, all the five serum samples (three from uninfected in-contact and two from infected cattle) demonstrated >2.4 $\log_{10}$ antibodies against FMDV serotypes O, A and Asia-1 suggestive of recent vaccination in the phase of FMD outbreak. In 3A NSP ELISA both the serum samples from infected cattle were highly positive for anti- 3A NSP antibodies indicative of recent FMDV infection. The exact reason for the FMD outbreak could not be ascertained. However, on enquiry it was revealed by the livestock owner that he had recently returned from a neighbouring state where FMD outbreak was going on and thus the introduction of the FMDV through an inanimate object in the vicinity of the animals may be the probable cause of outbreak. The morbidity rate was very low and no FMD case was detected from the immediate surrounding villages. Further investigations revealed that the buffaloes reared in the same premises remained protected from the FMDV. FMD outbreak was also recorded in this area in April 2003 (Sharma and Kakker, 2005) and FMDV serotype O was isolated.

FMD outbreak at Shri Vaishnav Aggarsain Gaushala, Agroha during January 2008: Of the 2716 cattle (940 calves: 875 vaccinated, 65 unvaccinated; 1776 heifers and adults, all vaccinated), a total of 8 animals (0.29%, 2 bulls, 2 heifers and 4 calves) went down with the disease and FMDV serotype A was isolated from clinical samples collected from four affected animals. It is worth mentioning that none of the milch (100), adult infertile female (941) and breedable female (200) animals suffered. No death was reported in any of the age groups. The duration of the FMD outbreak was only for five days.

In LPB-ELISA, only five of the 10 serum samples from uninfected incontact healthy animals demonstrated persistent vaccinal antibodies >1.8 $\log_{10}$ against FMDV serotypes O and Asia-1. However, antibody response to FMDV serotype A was poor (<1.8 $\log_{10}$) indicative of weak immunity against serotype A. Further, all the eight serum samples from recovered animals demonstrated very high antibodies level (>2.4 $\log_{10}$) against FMDV serotypes O, A and Asia1 indicative of recent vaccination in the phase of FMD outbreak. In 3A NSP-ELISA, all these eight animals demonstrated antibodies against 3A-NSP of FMDV indicating thereby recent FMDV infection. The pre-disposing factor for this FMD outbreak was believed to be the introduction of few cattle saved by the police from the illegal traffickers. Further investigations revealed that no FMD outbreak was recorded in this area for the last five years.

FMD outbreak at village Azad Nagar during January 2008: Of the total 4553 animals (2133 buffaloes, 1325 cattle, 1030 sheep and 65 goats) only two cattle went down with the disease and FMDV serotype A was isolated from clinical samples collected from both the affected animals. The disease was recorded in the milch animals only. In 3A NSP-ELISA, both the affected animals demonstrated antibodies against 3A-NSP of FMDV indicating recent FMDV infection. Initially, the disease started due to the introduction of one new cow purchased from neighbouring state and subsequently infected another cow in the same premises. However, the morbidity rate was very low. Further investigations revealed that the buffaloes reared in the same premises remained protected from the FMDV. This was also evident from the five serum samples tested by LPB-ELISA wherein three buffaloes tested demonstrated high vaccinal antibodies (>2.1 $\log_{10}$) against FMDV serotypes O and Asia1, whereas, the antibody response to serotype A was poor.

On the basis of FMD outbreaks recorded since the start of FMD Control Programme (FMD-CP) in

January 2004, it has been observed that all the FMD outbreaks had occurred during January to March each year (Sharma and Kakker, 2005, Kakker and Sharma, 2007). It is, therefore, pertinent to initiate the FMD vaccination schedule during the months of November and December, so that the animals exhibit heightened immune response during next quarter, which may protect the herd against heavy aerosol virus in the environment. The number of outbreaks recorded during the earlier years were one in 2006, three in 2005 (Kakker and Sharma, 2007), 15 in 2004, 111 in 2003 (Sharma and Kakker, 2005), 26 in 2002 (Kakker and Sharma, 2003), and 52 in 2001 (Sharma *et al.*, 2002). The less number of FMD outbreaks during 2007 and 2008 may perhaps be due to the development of herd immunity through mass vaccination of susceptible animals in Haryana. Further, no mortality was observed in any of the three FMD outbreaks during this period. In contrast, 32 and 18 animals died in 2006 and 2005, respectively due to combined infection with *Pasteurella multocida* (Kakker and Sharma, 2007).

All the three FMD outbreaks during 2007 and 2008 were recorded in Hisar district of Haryana involving cattle only and virus was successfully identified from all the eight samples using sandwich ELISA. Only two virus serotypes were recorded viz: FMDV serotype O (2) and serotype A (6). Likewise, during the previous years (2005 and 2006), only two virus serotypes viz. O and Asia-1 were recorded (Kakker and Sharma, 2007). The FMD virus serotypes Asia-1 and C were not recorded during 2007 and 2008.

Acknowledgements

The authors wish to thank the Indian Council of Agricultural Research (ICAR), New Delhi, Project Directorate on FMD, IVRI Campus, Mukteswar-Kumaon (Uttrakhand) and CCS Haryana Agricultural University, Hisar for providing funds and facilities. The authors are also thankful to the Director General and Field Officers of the Department of Animal Husbandry and Dairying, Govt. of Haryana for providing help in collecting specimens. The help rendered by the laboratory staff is also acknowledged.

REFERENCES

Bhattacharya, S., Pattnaik, B. and Venkataramanan, R. (1996). Development and application of sandwich enzyme-linked immunosorbent assay (ELISA) for type identification of foot-and-mouth disease (FMD) virus in direct field materials. *Indian J. Anim. Sci.* **66**: 1-9.

Hamblin, C., Barnett, L.T.R. and Crowther, J.R. (1986). A new enzyme linked immunosorbent assay for the detection of antibodies against foot-and-mouth disease virus. *J. Immunol. Methods* **93**: 123-129.

Kakker, N.K. and Sharma, R. (2003). Foot and mouth disease outbreaks in Haryana during the year 2002. *Haryana Vet.* **42**: 15-18.

Kakker, N.K. and Sharma, R. (2007). Foot and mouth disease outbreaks after the launch of FMD control programme in Haryana. *Haryana Vet.* **46**: 65-68.

Kakker, N.K. and Sharma, R. (2008). Retrospective Diagnosis of FMD outbreaks by liquid phase blocking ELISA. *Haryana Vet.* **47**: 28-31.

Kumar, N., Sharma, R. and Kakker, N.K. (2007). Non-structural Protein 3A for differentiation of foot-and-mouth disease infected and vaccinated animals in Haryana (India). *Zoonoses and Public Health* **54**: 376-82.

Maan, S., Kumar, A., Sharma, R. and Ahuja, K.L. (1998). Prevalence of foot and mouth disease virus types in North-West India. *Indian J. Virol.* **14**: 55-57.

Sharma, R., and Kakker, N.K. (2005). Scenario of foot-and-mouth disease outbreaks in Haryana state during the years 2003 and 2004. *Haryana Vet.* **44**: 47-51.

Sharma, R., Kakker, N.K. and Kumar, A. (2002). Occurrence of foot and mouth disease outbreaks in Haryana during 2001. *Haryana Vet.* **41**: 12-17.

Sharma, R., Kumar, A., Kakker, N.K. and Ahuja, K.L. (2006). Incidence and distribution of foot and mouth disease virus serotypes in Haryana between 1997-2000. *Haryana Vet.* **45**: 61-64.