

FOOT AND MOUTH DISEASE RESEARCH IN INDIA

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Foot and mouth disease is endemic in India since many centuries. It is present almost in all parts of the country and occurs round the year. Approximately 470 million domestic livestock are susceptible to FMD apart from the free-living and captive wild ungulates. Out of the possible seven, only four serotypes, e.g., 'O', 'A', 'C' and Asia 1 were ever recorded in India. Serotype 'C' too has not been recorded in the country since 1995. Vaccination against FMD is grossly inadequate in the country. The annual loss due to FMD in India is roughly estimated at US \$ 800 million. In order to diagnose FMD, to identify the serotype involved and to understand the prevalence and distribution of the disease in our country, a small project was initiated by the Indian Council of Agricultural Research in as early as 1971. It had its Central Laboratory located at Mukteswar Campus of Indian Veterinary Research Institute (IVRI) and four Regional Centres in four corners of the country. With the launching of intensive cattle development programmes through cross-breeding of indigenous cattle with exotic breeds, the incidence of FMD too increased in India. Accordingly, the project activities also increased.

It has now been upgraded to an independent Project Directorate on Foot and Mouth Disease under the overall control of Indian Council of Agricultural Research. It is currently located at Mukteswar hills of Northern Himalaya. It also coordinates the All India Epidemiological Research Programme of FMD through 8 Regional Cooperating Centres and 15 Network Units located across the length and breadth of the country. Funds are provided to the Centres and Units centrally from the Project Directorate. Both the the Centres and Network Units carry out intensive surveillance for FMD within the area of their responsibility, record outbreaks of FMD, collect both epidemiological data of the outbreak and specimen for laboratory confirmation of the outbreak. Nearly 2500 outbreaks of

FMD were reported and investigated by the Regional Centres and Units in the year 2002-03. These Centres/Units also carry out laboratory diagnosis and serotyping of suspected specimen from reported outbreaks by a sandwich ELISA. The Centres try to isolate the positive specimen in cell culture. Besides this, the Centres also carry out sero-monitoring following vaccination by a liquid phase blocking ELISA (LPBE) of representative post-vaccinate sera samples within the area of their jurisdiction. Both the Centres and the Units forward about 50 to 70% of the specimen, either in the form of tissue or isolated in cell culture, to the Central Laboratory located at Mukteswar.

The Central Laboratory of the Project Directorate at Mukteswar, prepares and optimizes the reagents required both for sandwich ELISA as well as for LPBE. These reagents and other consumables are distributed to the Regional Centres and Network Units on demand. It also repeats the tests, both sandwich ELISA and LPBE on the samples referred to the Central Laboratory by the Regional Centres/Units. It has been recorded that about 85% of the outbreaks of FMD in India are caused by serotype 'O', followed by 'A', which account for about 8 to 10% and the rest due to Asia 1.

Detailed antigenic characterization of representative field isolates from the entire country is also carried out at the Central Laboratory with the help of a battery of well-characterized monoclonal antibodies as well as polyclonal rabbit/guineapig and cattle sera. Molecular epidemiology of FMD is carried out mostly by nucleotide sequencing of the 1D gene and/or the entire P1 region. Antigenic characterization of recent virus isolates has shown that the vaccine virus strains are adequate to protect animals against the currently circulating virus. The molecular epidemiological studies have established that the Pan-Asian strain is the major cause of outbreak of FMD involving serotype 'O' in India. However a newly emerged subgroup slightly different from the well-established Pan-Asian strain was responsible for outbreaks in two-third of the country in the year 2001-02, though, it has disappeared subsequently. It has also been established that out

of a possible ten genotypes of serotype 'A', only two, i.e., VI and VII are circulating in India for the last 20 years. In Asia 1 too, genotypes VIA and VIB are co-circulating in India. The entire sequence of FMD viral genome in respect of two virus strains of Asia 1, used in the vaccine by the three manufacturers, has been determined. The Project Directorate on FMD also provides technical support to the Government of India for FMD control programme in India. The Project Directorate has a virus repository comprising nearly 1200 field virus isolates of about 25 years with known antigenic and genetic make-up, besides a panel of well-characterized monoclonal antibodies against the major structural and non-structural proteins of FMD virus.

In 1974, Indian Veterinary Research Institute started a small automated vaccine production plant at Bangalore Campus of the Institute in Southern India with technical cooperation from Government of Denmark. Subsequently two more manufacturing plants have come up in both public and private sector, though the combined production capacity of all the three is much less than the amount required annually. There is also a small R&D programme on FMD vaccine at IVRI, which is exploring the possibilities of developing new-generation marker vaccines against FMD.

The Project Directorate on Foot and Mouth Disease has adequate capabilities of taking additional responsibilities for the entire South Asia in the capacity of a referral center including supply of diagnostic reagents, training and research.

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Classical Swine Fever:

It is endemic in India. Most of the outbreaks are recorded in the North-Eastern States of the country, where there is a substantial pig population. Sporadic outbreaks of CSF are also reported from other parts of the country. There is no centrally organized controlled programme for CSF in India. Diagnosis of CSF is carried out on the basis of gross and histo-pathology, serology and more recently by applying RT-PCR, where facilities are available. IVRI has standardized the technique of PCR for diagnosis of CSF from tissue specimen. The Institute also produces limited quantity of lapinized vaccine against CSF. A few of the State Biological Production Centres, particularly in the East and North-East of the Country, too produce this vaccine. Attempts are being made to develop a cell-culture based vaccine for CSF.
