Understanding FMD viral ecology and landscape epidemiology toward control and eradication FMD in India

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Organizational set up
Directorate of FMD

- CENTRAL LABORATORY, Mukteshwar
- International Center for FMD, Bhubaneswar
- NRC on Yak, Dirang
- NRC on Mithun, Nagaland

ICAR-Project Directorate on FMD
IVRI Campus, Mukteswar-263138
**Susceptible Livestock population in India**

<table>
<thead>
<tr>
<th>Animal</th>
<th>Population (Million)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>190.90</td>
</tr>
<tr>
<td>Buffalo</td>
<td>108.70</td>
</tr>
<tr>
<td>Sheep</td>
<td>65.06</td>
</tr>
<tr>
<td>Goat</td>
<td>135.17</td>
</tr>
<tr>
<td>Pig</td>
<td>10.29</td>
</tr>
<tr>
<td>Yak</td>
<td>0.077</td>
</tr>
<tr>
<td>Mithun</td>
<td>0.298</td>
</tr>
<tr>
<td>Camel</td>
<td>0.40</td>
</tr>
</tbody>
</table>

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Total: 510.89 Million

# India has size of >3.2 million sq km

Administrative units 29 states (Further consist of 666 Districts and >6,000,000 villages are there in the country.

Source: DAHDF, GOI, 2012
Present National Scenario

- Type O: 79%
- Type A: 14%
- Type Asia1: 7%

Last, type C incidence in 1995
Foot & Mouth Disease Control Programme (FMDCP)

- Fifty four (54) districts in which control programme started in 2003-04 are marked red.
- One sixty seven (167) districts in which the control programme started in 2010-11 are marked green.
- FMDCP implemented in 2013-14.
- FMDCP implemented in 2015-16
- Not covered under FMDCP

Understanding FMD Viral Ecology and Landscape Epidemiology toward Control and Eradication

[ICAR-PDFMD & ARS (USDA) Collaboration]
Study site- Dairy premise, Central India

Number of reported cases per week

1st case reported- 24th December, 2013
The last clinical case- 31st Jan, 2014

<table>
<thead>
<tr>
<th>Weeks</th>
<th>FMD cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>40</td>
<td>(18% *)</td>
</tr>
<tr>
<td>2</td>
<td>82</td>
<td>(37% *)</td>
</tr>
<tr>
<td>3</td>
<td>52</td>
<td>(23% *)</td>
</tr>
<tr>
<td>4</td>
<td>34</td>
<td>(15% *)</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
<td>(6% *)</td>
</tr>
</tbody>
</table>

* Out of 222

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Clinically affected cattle

% Positive

% NSP Positive
% Genome Positive
% Isolation Positive

Months post outbreak

Asymptomatic In-contact Cattle

% Positive

% NSP Positive
% Genome Positive
% Isolation Positive

Months post outbreak
Clinically affected buffalo

% Positive

Months post outbreak

% NSP Positive
% Genome Positive
% Isolation Positive

Asymptomatic In-contact buffalo

% Positive

Months post outbreak

% NSP Positive
% Genome Positive
% Isolation Positive
• Genetic and antigenic characterization of the isolates obtained from OPF of persistently infected animals is in progress.
Conclusions:

- In present study, **NSP- Ab titer is lower** in buffalo than cattle.

- The **NSP- Ab positive proportion** was consistently lower for asymptomatic category compared to clinical recovered animals.

- Not much difference in the **genome detection proportion** between clinically recovered and asymptomatic category animals.

- **Duration of FMD virus persistence** is more in buffalo than cattle under natural condition.

- **Virus clearing** with time in both the category of animals is evident from gradual decline in proportion of viral genome and virus isolation positive samples and gradual decline in NSP-Ab titer.
Acknowledgements

• All the scientific and technical staff of ICAR- PDFMD, Mukteshwar
• Indian Council of Agricultural Research, New Delhi
• Staff of Dairy Farm
• Luis Rodriguez and Jonathan Arzt, PIADC, ARS, USDA
• DTRA and United States Strategic Command Centre
• Maria Sterlyadkina, SAIC/TTI DTRA CLS Support
• GFRA
Thanks for your kind attention