FMD Global Situation: Understanding regional risks and priorities to control outbreaks

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Conjectured global status

**Endemic pools**

- Virus ecosystems that maintain specific FMD virus strains
- Seven FMDV serotypes with an unequal distribution
  - No reported serotype C outbreaks since 2004 (Kenya and Brazil)
- Control via (tailored) vaccination and supporting diagnostics
Trans-pool movements of FMDV since 2015

Underlying causes:

- Movement of animals (increased demand for animal protein)
- Migration of people with animal products
- New opportunities (road building)
Regional FMDV situation in Southeast Asia

- Viral sequences highlight most frequent connections between countries (reflect trade and animal movements)

Current risks comprise:

1. Resident FMD viral lineages

2. New trans-regional threats
   - FMD virus spread within the region (particularly from SEA to East Asia)
   - New viral introductions (particularly Pool 2)
## Pool 1: Status in 2020

Characterisation of different FMD virus lineages

Based on data from WRLFMD, RRLSEA and the OIE/FAO Lab Network

<table>
<thead>
<tr>
<th>Country</th>
<th>(date of last shipment to WRLFMD)</th>
<th>O</th>
<th>A</th>
<th>Asia-1</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td>ME-SA/Ind-2001</td>
<td>SEA/Mya-98</td>
<td>CATHAY</td>
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Is this the true picture of FMD in SEACFMD countries? 
......... or does under-sampling bias our understanding of the epidemiology of the disease?
Can we anticipate new FMD virus threats in South Asia?

- Samples received from Sri Lanka
- Outbreaks in cattle (2018/2019)
- New viral lineage within the O/ME-SA topotype (but not O/ME-SA/Ind-2001)
- Sequence identity (~92%) to an Indian virus from 2010
- OIE/FAO Network meeting last week highlighted genetically related viruses detected recently in India
- Will viruses from this lineage become established in Pool 2?
Vaccine selection for endemic pools

Obvious gaps and challenges:

1. The quality and performance of FMDV vaccines cannot be easily assessed through direct testing
2. Homologous/monovalent QA/QC (OIE Manual) vs heterologous vaccine performance in the field with multivalent products

Proposed testing by FMD Reference Laboratories:

- Increased focus on measurement of heterologous responses
- Using final formulated product supplied to customers
- Use common/standardized FMDV viruses (Antigen Panels) representative of the antigenic threats in a region – proposal for reference antigens for East Africa (https://www.wrlfmd.org/node/2096/)
- Allows studies to be undertaken to compare FMD vaccines from different suppliers
- Work still required to define and validate serological cut-offs

Key messages

- Epidemiology of FMD is dynamic
  - New unpredictable patterns
  - Impact upon selection and deployment of vaccines
- Sampling of field outbreaks is critical
- Importance of an active FMD Reference Laboratory Network to facilitate sample collection from FMD outbreaks in the field—to feed real-time lab data back to FMD control programmes
Additional information

- FMD reports and lab testing ([https://www.wrlfmd.org/ref-lab-reports](https://www.wrlfmd.org/ref-lab-reports))
  - Genotyping reports, Vaccine matching and Serotyping reports

- Other data sources:
  - Quarterly WRLFMD/EuFMD report ([https://www.wrlfmd.org/ref-lab-reports](https://www.wrlfmd.org/ref-lab-reports))
Acknowledgements

- Support for the WRLFMD and research projects
- Collaborating FMD Reference Laboratories and field teams
- Partners in Southeast Asia and within the OIE/FAO FMD Lab Network
Vaccine Matching – field samples from SEA/East Asia

Serotype O (2015-19)

- **O-Manisa**: 16 field isolates
- **O-3039**: 15 field isolates
- **O-TUR/5/2009**: 20 field isolates

- **O/SEA/Mya-98**: 20 field isolates
- **O/ME-SA/Ind-2001**: 15 field isolates
- **O/ME-SA/PanAsia**: 9 field isolates
- **O/CATHAY**: 16 field isolates

NB: New vaccine-matching data for samples from most recent shipment from Vietnam are expected end Sept 2020
Vaccine Matching – field samples from SEA/East Asia
Serotype A (2015-19)

- A-Iran-05: 23 samples tested, 8 matched, 15 not matched
- A-TUR/20/2006: 24 samples tested, 24 matched
- A22: 24 samples tested, 24 matched
- A-MAY/97: 20 samples tested, 5 matched, 15 not matched

Proline RGD+3 Predictive of protection for A22
PVM in SEA provides evidence of protective titres after vaccination
Example of epidemiological complexity in SEA: Samples from Vietnam submitted in 2018

- Remarkable range of (7) FMD virus lineages detected
  - Serotype O topotypes: O/CATHAY, O/ME-SA/PanAsia, O/ME-SA/Ind-2001e, O/SEA/Mya-98 (two genetic clades)
  - Two genetic lineages of A/ASIA/Sea-97
  - Recent shipment (received in 2020) found O/SEA/Mya-98 (n=7), O/ME-SA/PanAsia (n=2) and O/ME-SA/Ind-2001e (n=22)