



OIE/FAO
Foot-and-Mouth Disease
Reference Laboratories
Network



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

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FAO World Reference Laboratory for FMD and OIE Reference Laboratory

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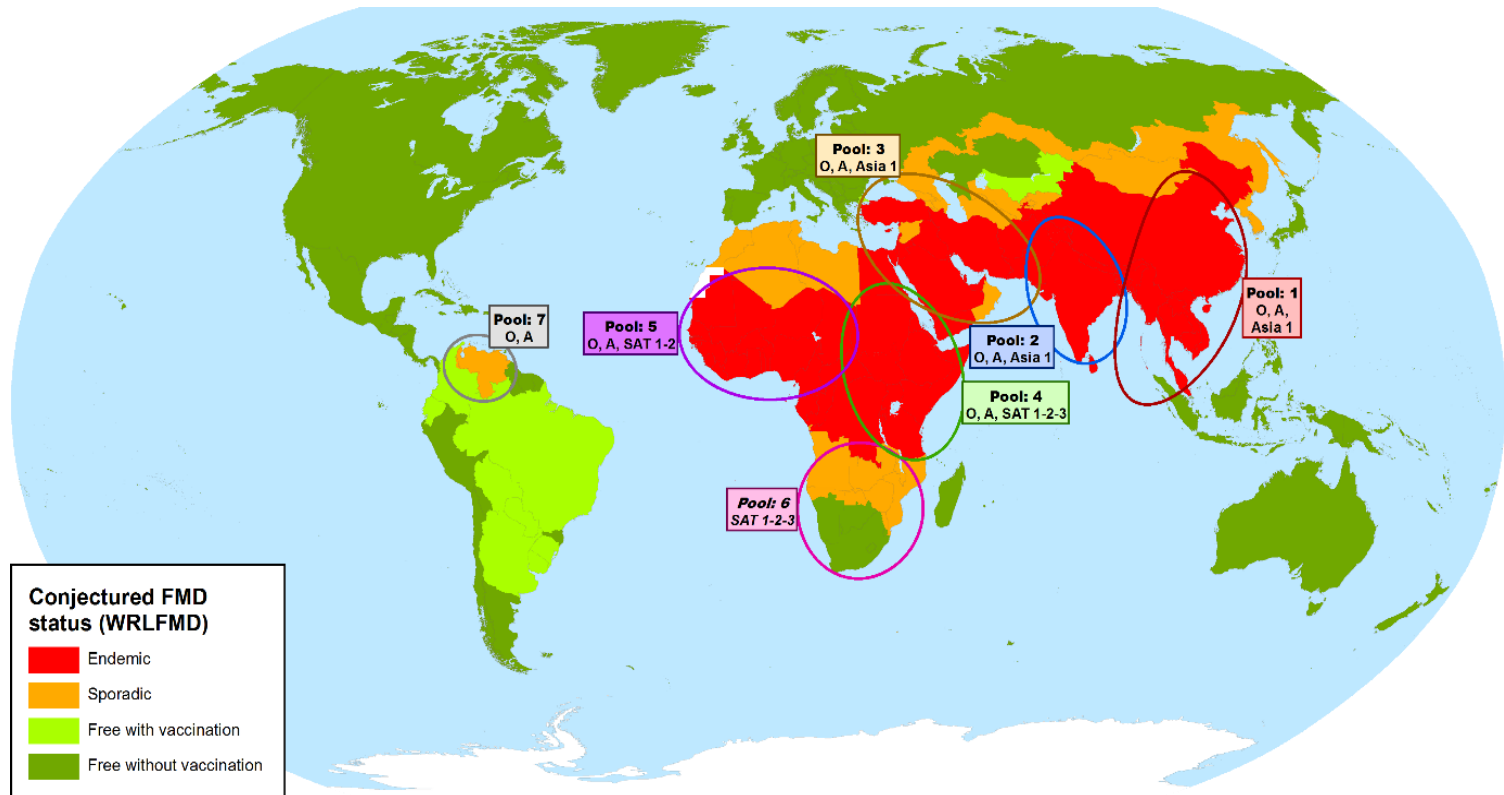
FMD Reference Laboratory



Conjectured global status

Endemic pools

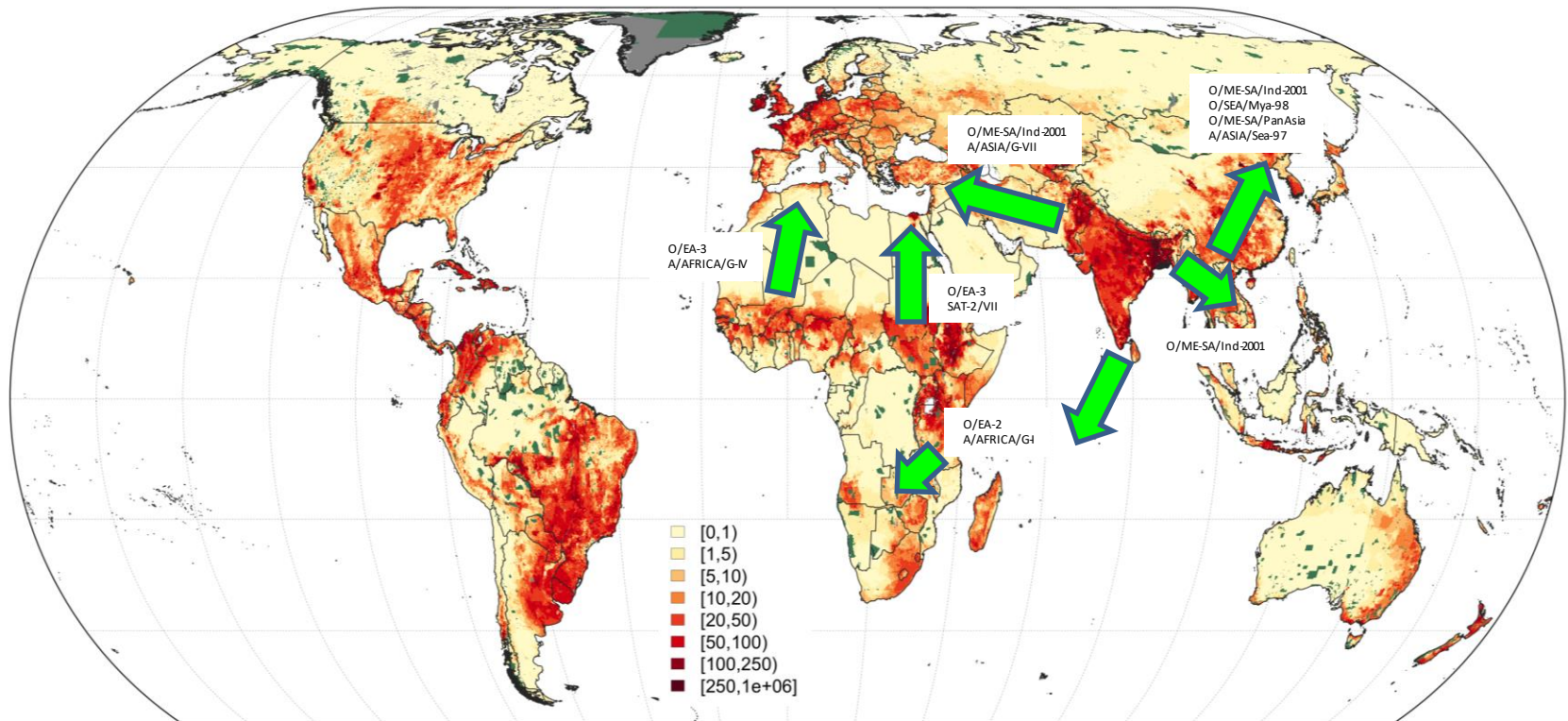
- Virus ecosystems that maintain specific FMD virus strains
- Seven FMDV serotypes with an unequal distribution
 - No reported serotype C outbreaks since 2004 (Kenya and Brazil)
- Control via (tailored) vaccination and supporting diagnostics



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)



Cattle density map

Robinson et al., 2007

Regional FMDV situation in Southeast Asia

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

Current risks comprise:

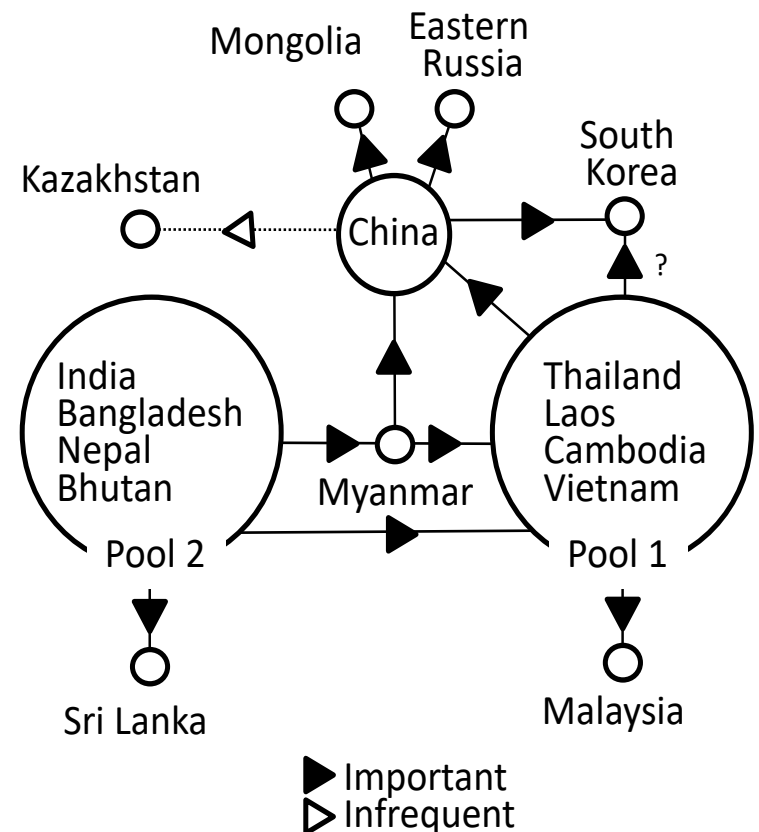
1. Resident FMD viral lineages

- O/SEA/Mya-98, O/ME-SA/PanAsia, O/CATHAY, A/ASIA/Sea-97 and O/ME-SA/Ind-2001

2. New trans-regional threats

- FMD virus spread within the region (particularly from SEA to East Asia)
- New viral introductions (particularly Pool 2)

Conjectured FMDV connections within South Asia, Southeast Asia and East Asia



Pool 1: Status in 2020

Characterisation of different FMD virus lineages



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

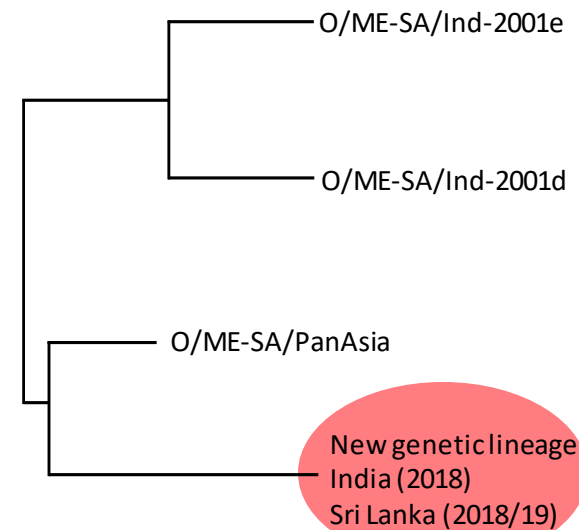
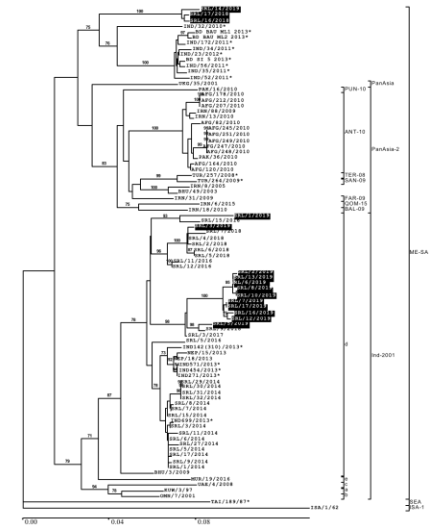
Country (date of last shipment to WRLFMD)	O					A		Asia-1
	ME- SA/Ind- 2001	SEA / Mya-98	CATHAY	ME-SA / PanAsia	ME-SA/ PanAsia-2	ASIA / Sea-97	ASIA/Ind	
Cambodia (2017)		2016		2018		2016		
Laos (2018)	2020	2017		2018		2018		
Malaysia (2018)	2018	2016	2005		2009	2014		
Myanmar (2019)	2019	2019				2019	2010	2017
Thailand (2019)	2020	2018	2012	2019		2019		
Vietnam (2020)	2019	2019	2018	2018		2017		2006
PR China (2020)	2019	2020	2019	2019		2019		2009
Mongolia (2019)	2018	2018		2017		2015		

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



AU-PANVAC
The African Union's Vaccine Center of All-Union



Twining project 2019-2022

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

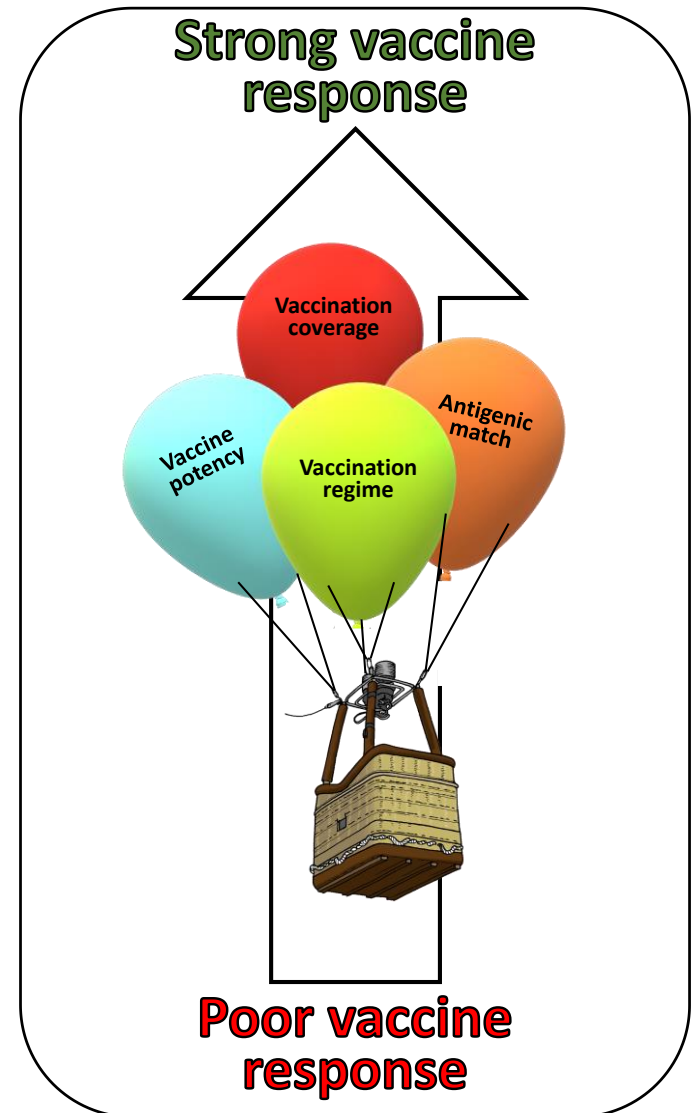
Proposed testing by FMD Reference Laboratories:

- 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

See Barnett et al., (2003) Foot-and-mouth disease vaccine potency testing: determination and statistical validation of a model using a serological approach. Vaccine 21: 3240.

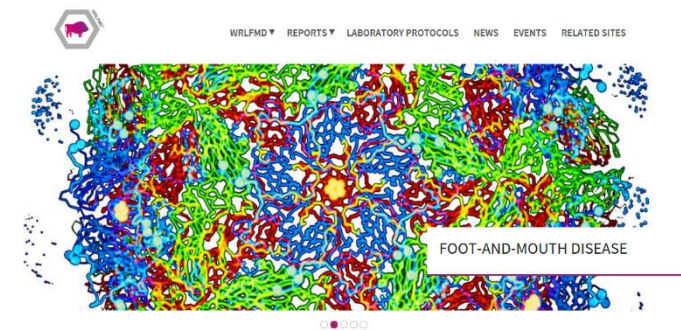
Key messages

- 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>)
 - *Genotyping reports, Vaccine matching and Serotyping reports*
- Other data sources:
 - Quarterly WRLFMD/EuFMD report (<https://www.wrlfmd.org/ref-lab-reports>)
 - Annual report of the OIE/FAO FMD Laboratory Network (<http://foot-and-mouth.org/>)



Welcome



The Pirbright Institute is designated as the World Reference Laboratory for Foot-and-Mouth Disease by the Food and Agriculture Organization (FAO) of the United Nations and as a reference laboratory for FMD by the Office International des Epizooties (OIE).

Country FMD Reports




Details of samples tested for FMD at WRLFMD from around the world.

Country Reports >



WRLFMD Quarterly Report
April to June 2019

Foot-and-Mouth Disease



OIE/FAO Foot-and-Mouth
Disease Reference Laboratory
Network

Annual Report 2019

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- Collaborating FMD Reference Laboratories and field teams
- Partners in Southeast Asia and within the OIE/FAO FMD Lab Network



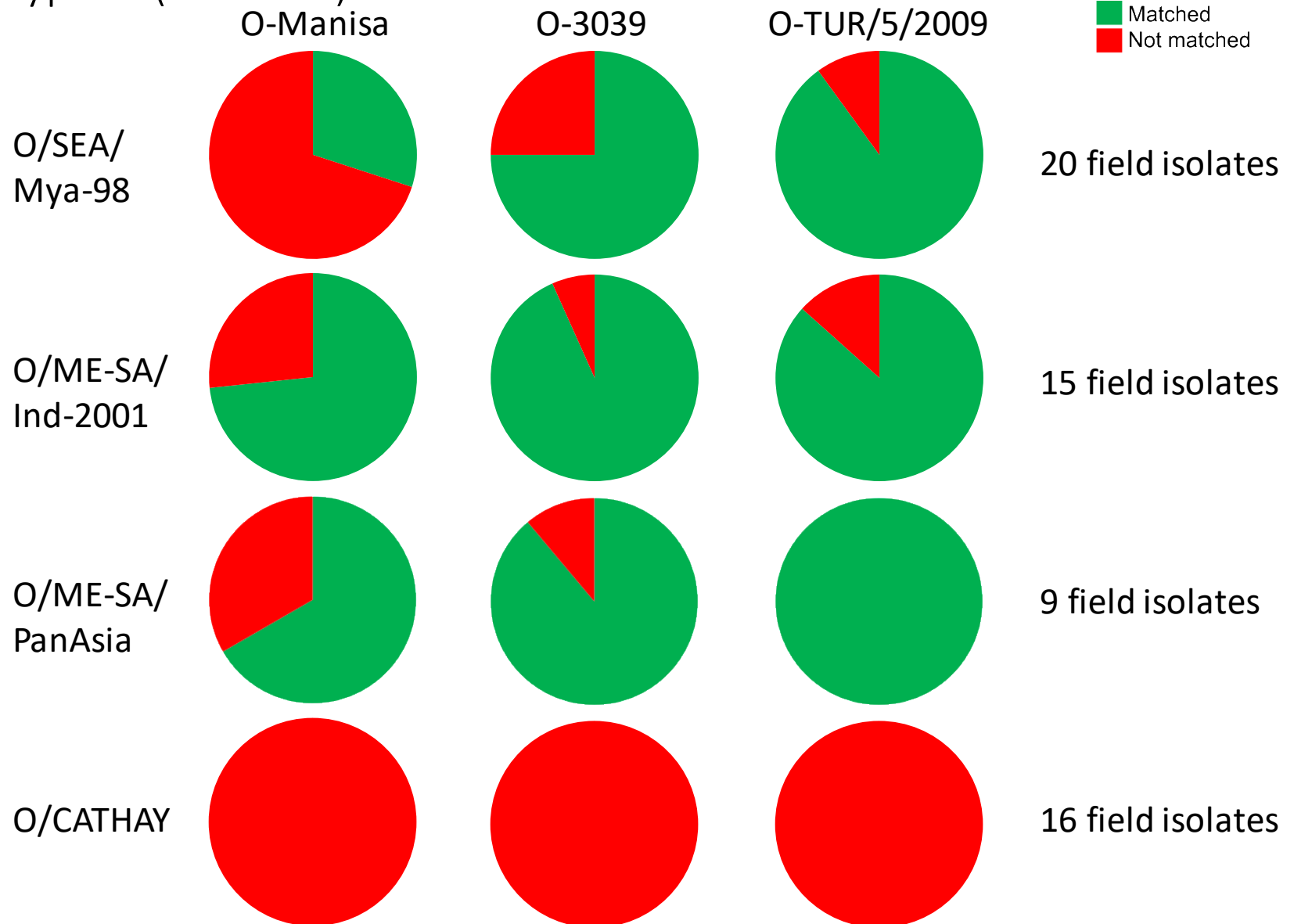
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Vaccine Matching – field samples from SEA/East Asia

Serotype O (2015-19)

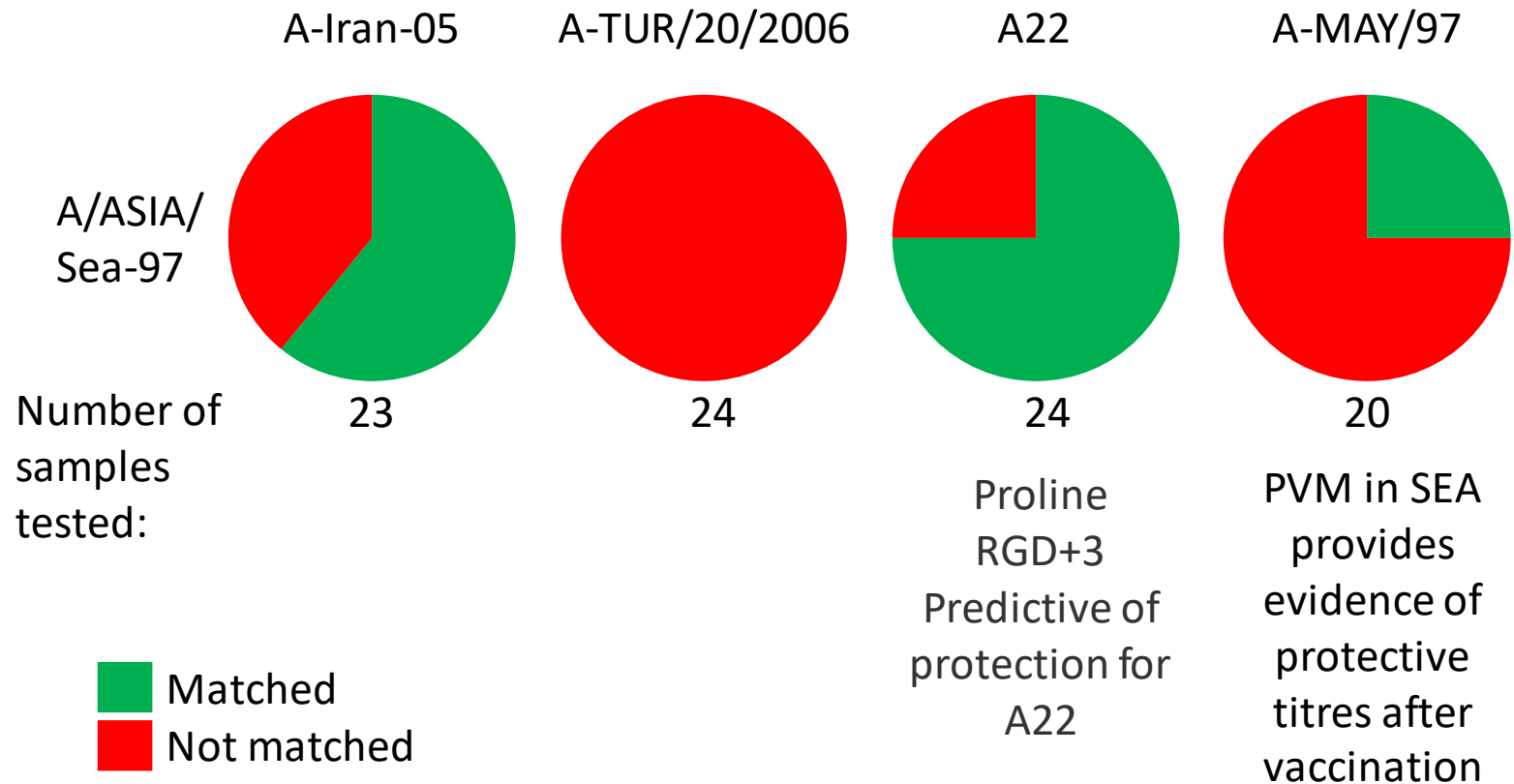
Matched
Not matched



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)



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)

