



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



Global and Regional FMD Update

Donald King

on behalf of the OIE/FAO FMD Laboratory Network

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Acknowledgements: Valerie Mioulet, Anna Ludi, Nick Knowles, Ginette Wilsden Abid Bin-Tarif, Hayley Hicks, Lissie Henry, Alex Gidley, Andrew Shaw, Antonello Di Nardo, Ashley Gray, Beth Johns, Mark Henstock, Jemma Wadsworth, Clare Browning, Britta Wood, Natasha Edwards, David Paton, Dexter Wiseman, Julie Maryan, Sarah Belgrave

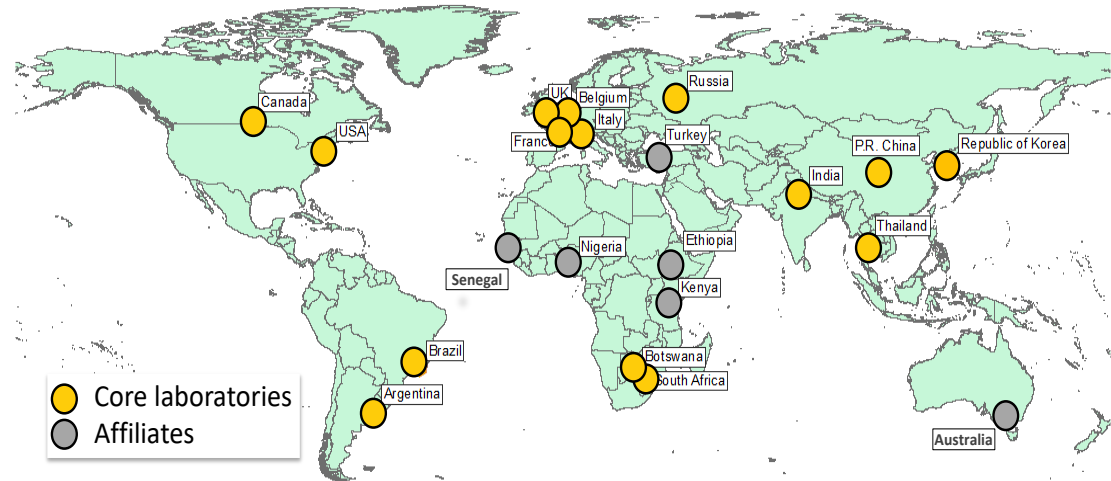
OIE/FAO FMD Laboratory Network

www.foot-and-mouth.org



Network Members and affiliates:

New member: Wageningen Bioveterinary Research (WBVR), The Netherlands as FAO Reference Centre for FMD



Core activities:

- Collation and exchange of data
- Test improvement and harmonization
- **Understanding FMD epidemiology and the changing pattern of risk**

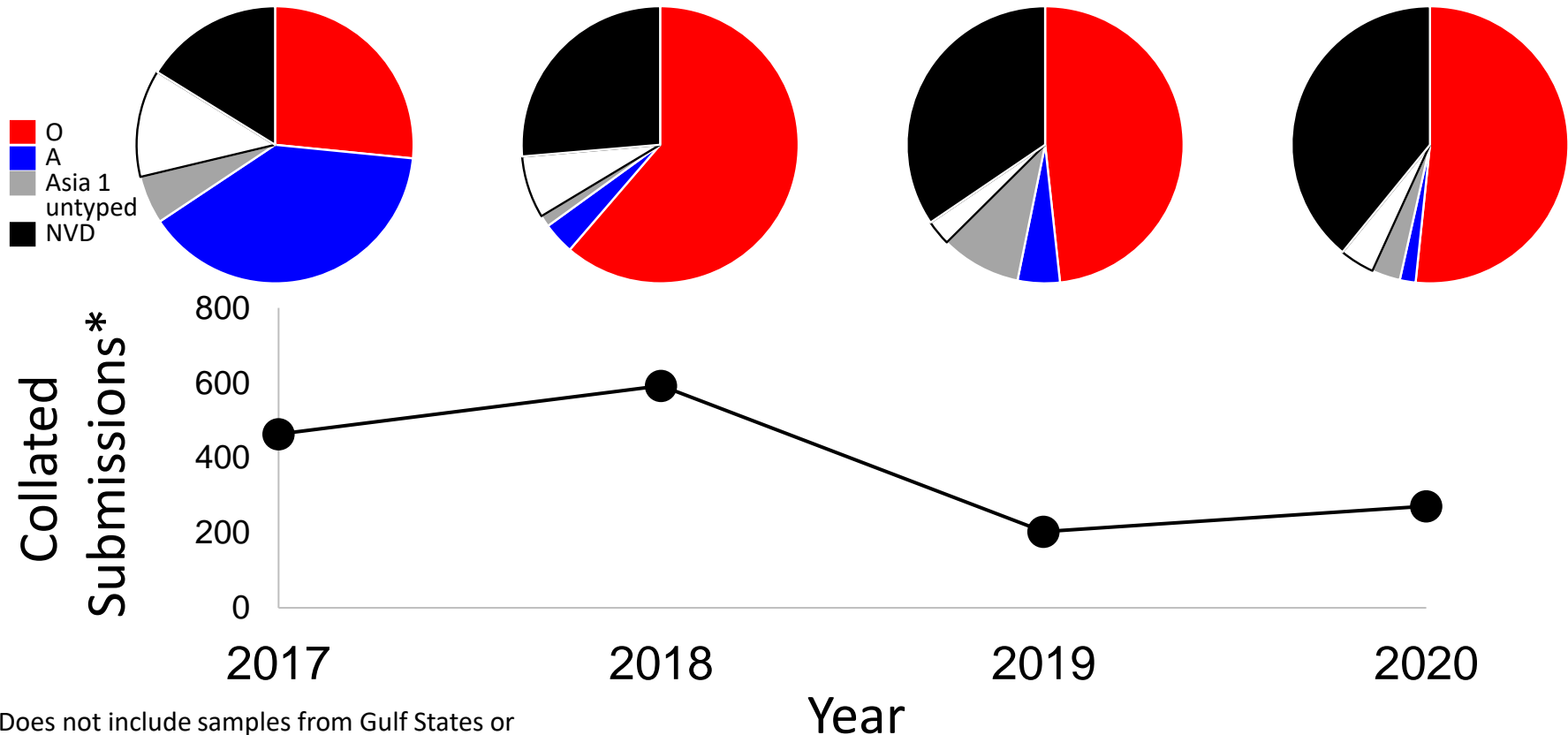


Network "virtual format" with >70 participants – December 2020

Collated data for West Eurasia Roadmap countries (2017-20)*



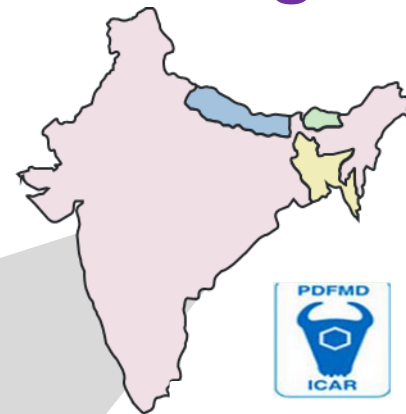
- Data from ARRIAH (Russia), ŞAP Institute (Turkey) and WRLFMD
- 2015-2017: spread of A/ASIA/G-VII
- Since 2018: increased dominance of serotype O in the region



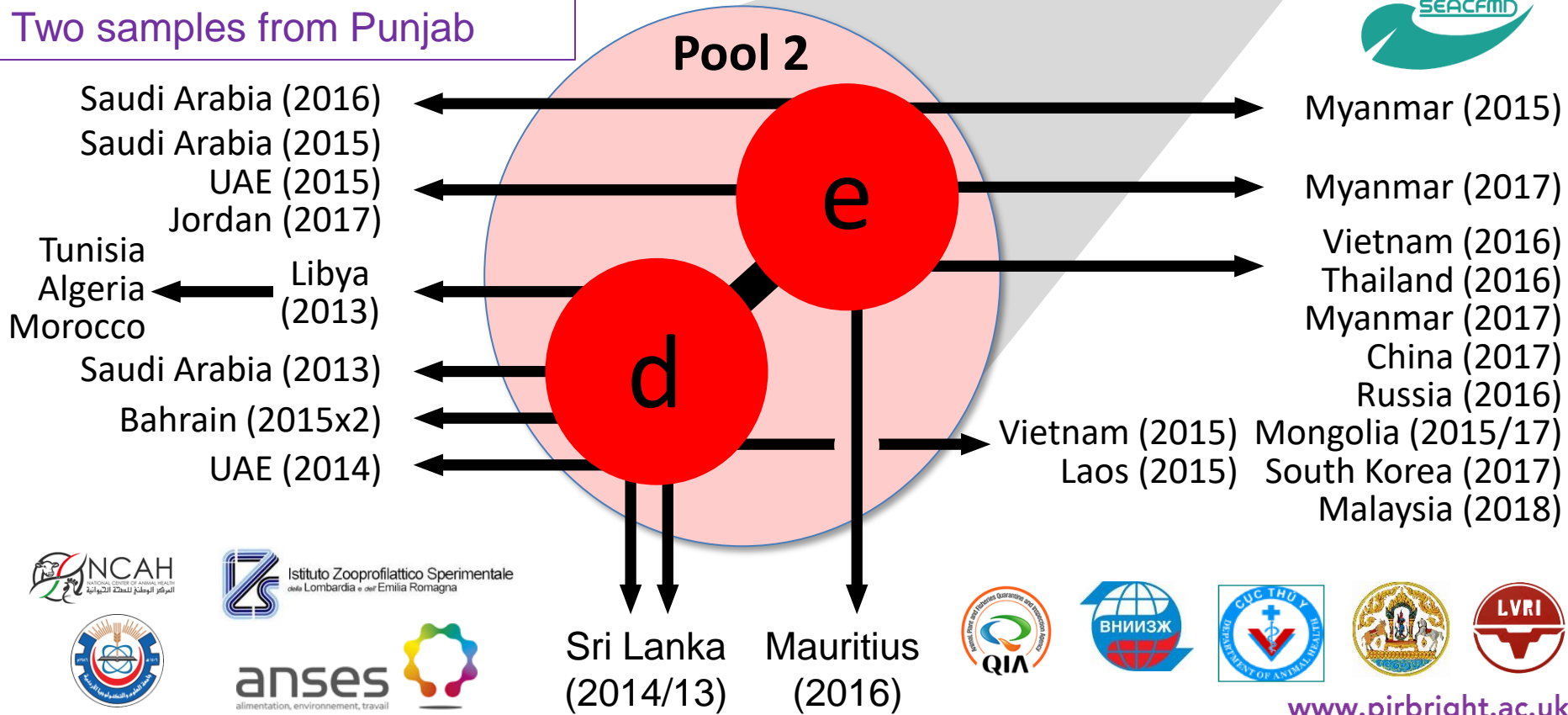
*Does not include samples from Gulf States or countries in the Eastern Mediterranean

Further expansion of the O/ME-SA/Ind-2001 lineage

- Two sub-lineages (d and e)
- Since 2013, full genomic sequences indicates that there have been multiple “escapes” from Pool 2
(Bachanek-Bankowska et al., 2018)



2019: New cases in Pakistan
Two samples from Punjab



Diversity of FMD viruses in Pakistan

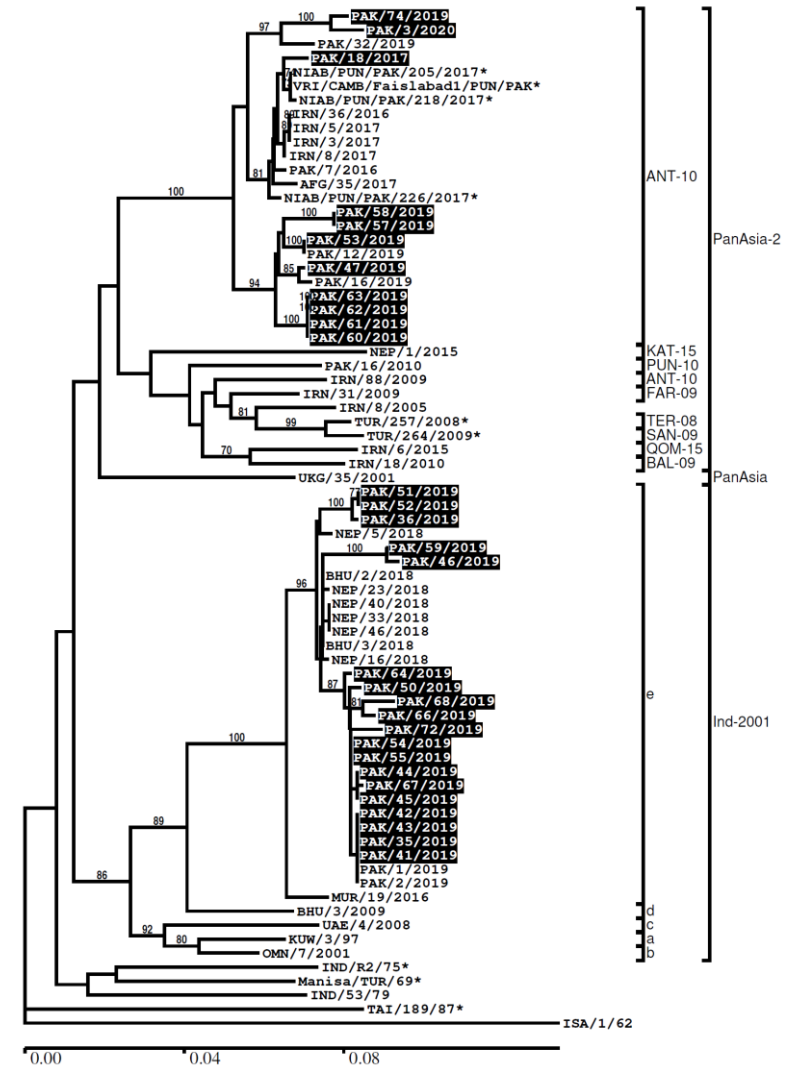


Food and Agriculture Organization
of the United Nations

- 50 samples collected from 2016-20 sent via FAO Pakistan Office
 - O/ME-SA/Ind-2001e (n=19)*
 - >99% nt identity to viruses collected from potential source countries (Nepal, Bhutan and India)

High diversity of FMDV sequences

- Serotype O:
 - O/ME-SA/PanAsia2^{ANT-10} (n=11)
- Serotype A (n=5)
 - Representing 4 different genetic lineages: A/ASIA/Iran-05^{SIS-13}, A/ASIA/Iran-05^{FAR-11} and two un-named clades
- Serotype Asia 1 (n=9)
 - Representing three viral sub-lineages within Asia 1/Sindh-08



*Lineage first recognised in Pakistan in 2019 – see Hicks et al., 2020

What FMDV lineages are circulating in the region?

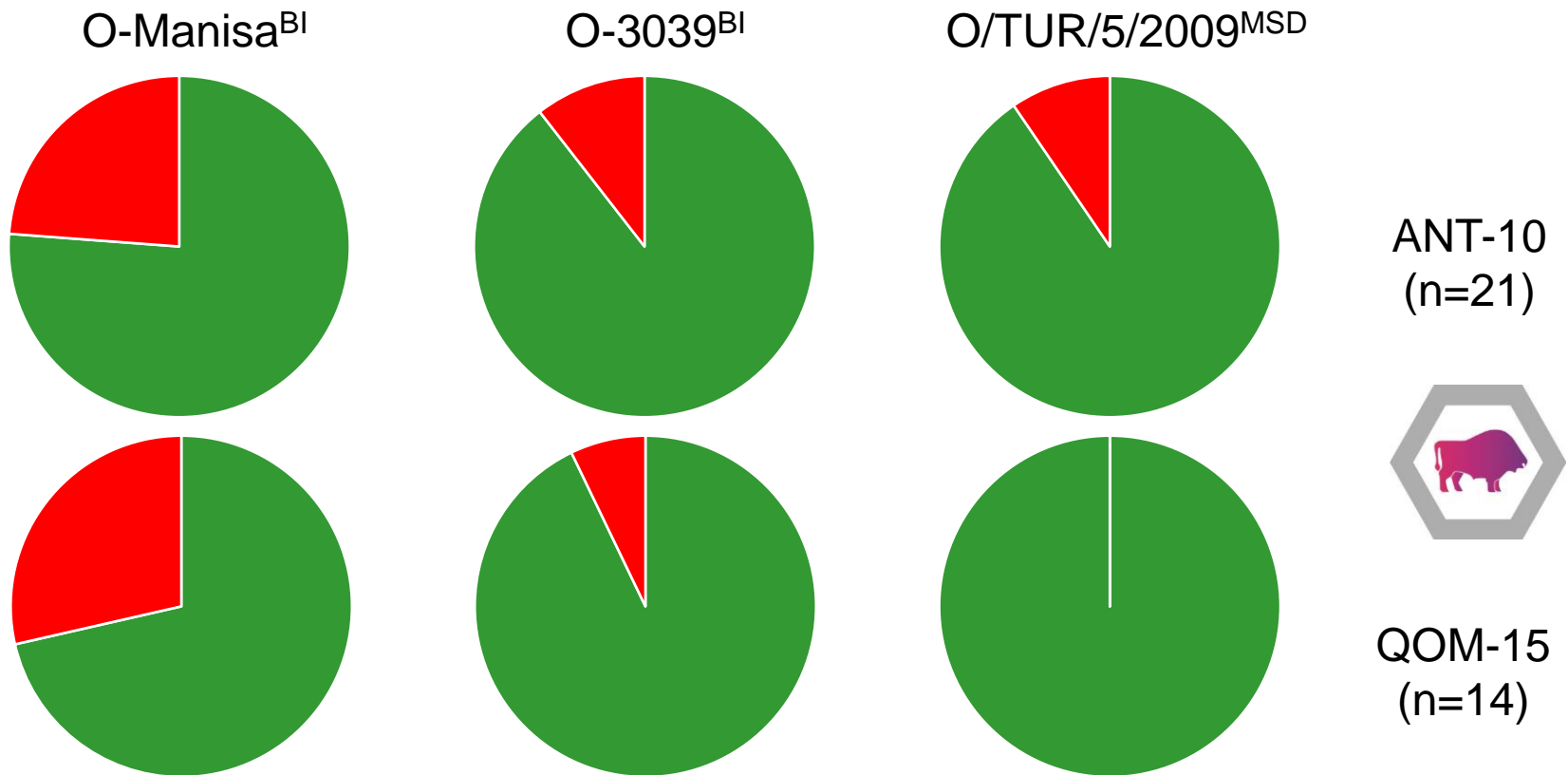
| Viral lineage: | West EurAsia | |
|-------------------------------------|--------------|--------------------------|
| O/ME-SA/PanAsia-2 | ✓ | ANT-10 & QOM-15 |
| A/ASIA/Iran-05 | ✓ | FAR-11 & SIS-13 |
| Asia-1 | ✓ | |
| A/ASIA/G-VII | ✓ | |
| O/ME-SA/Ind-2001e | ✓ | |
| O/EA-3 | } | Bahrain 2021 |
| A/AFRICA/G-I | | |
| SAT 2 topotypes VII & IV | | Bahrain 2012 & Oman 2015 |



Risks
from
Africa

- Spectrum of FMDV lineages need to be considered for vaccine selection

O/ME-SA/PanAsia-2 : vaccine matching (2014-2021)

- Quick and cost-effective laboratory assessment of the antigenic relationship between **field** and **vaccine** viruses



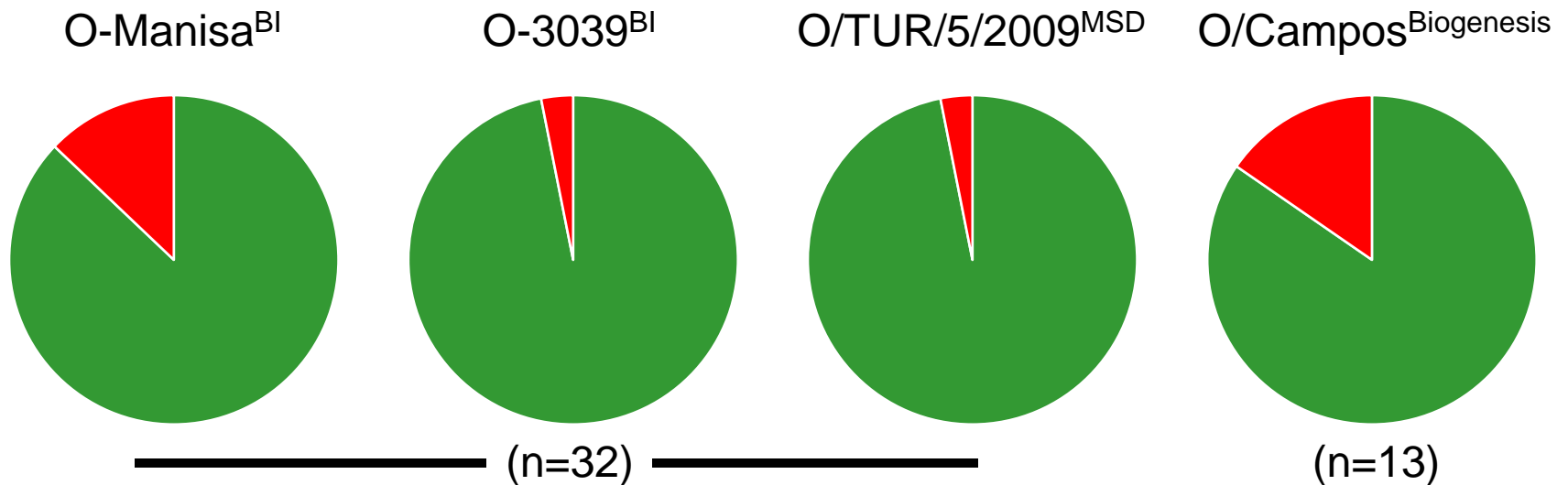
 Matched
 Not matched



PA-2 vaccines from ŞAP (QOM-15) and ARRIAH (ANT-10) also show good match

O/ME-SA/Ind-2001e: vaccine matching (2017-2021)

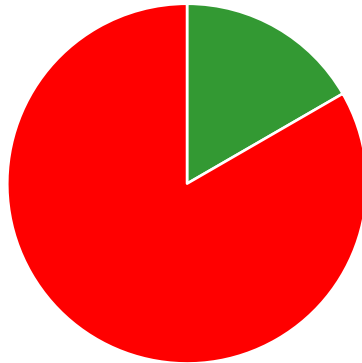
- Vaccine matching data from other regions where this lineage is present
- WRLFMFD data now includes O-Campos (from Biogenesis Bago)



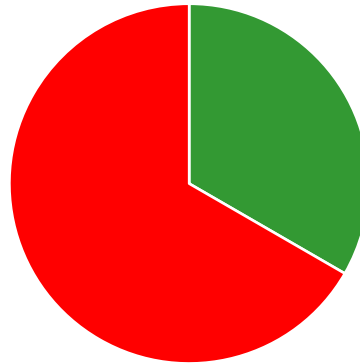
Similar encouraging data for ARRIAH vaccines (O/PanAsia2, O/Russia/SEA/2010 and O/Russia/SEA/2014) using O/Zabaikalsky/2019 isolate (cases from Pool 1)

A/ASIA/Iran-05: vaccine matching (2014-2021)

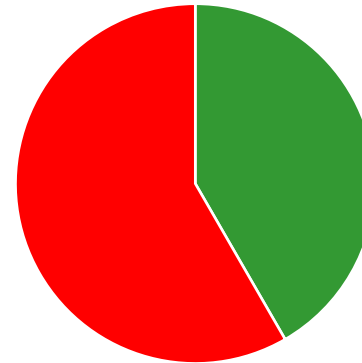
A/IRAN-05^{BI}



A/TUR/20/2006^{MSD}



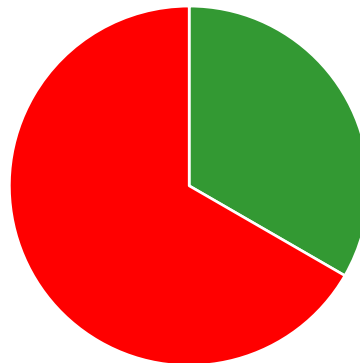
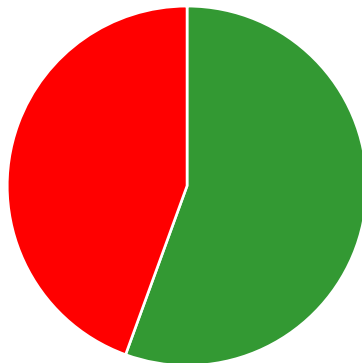
A22 IRAQ^{BI}





FAR-11
(n=12)



SIS-13
(n=9)



 Matched
 Not matched



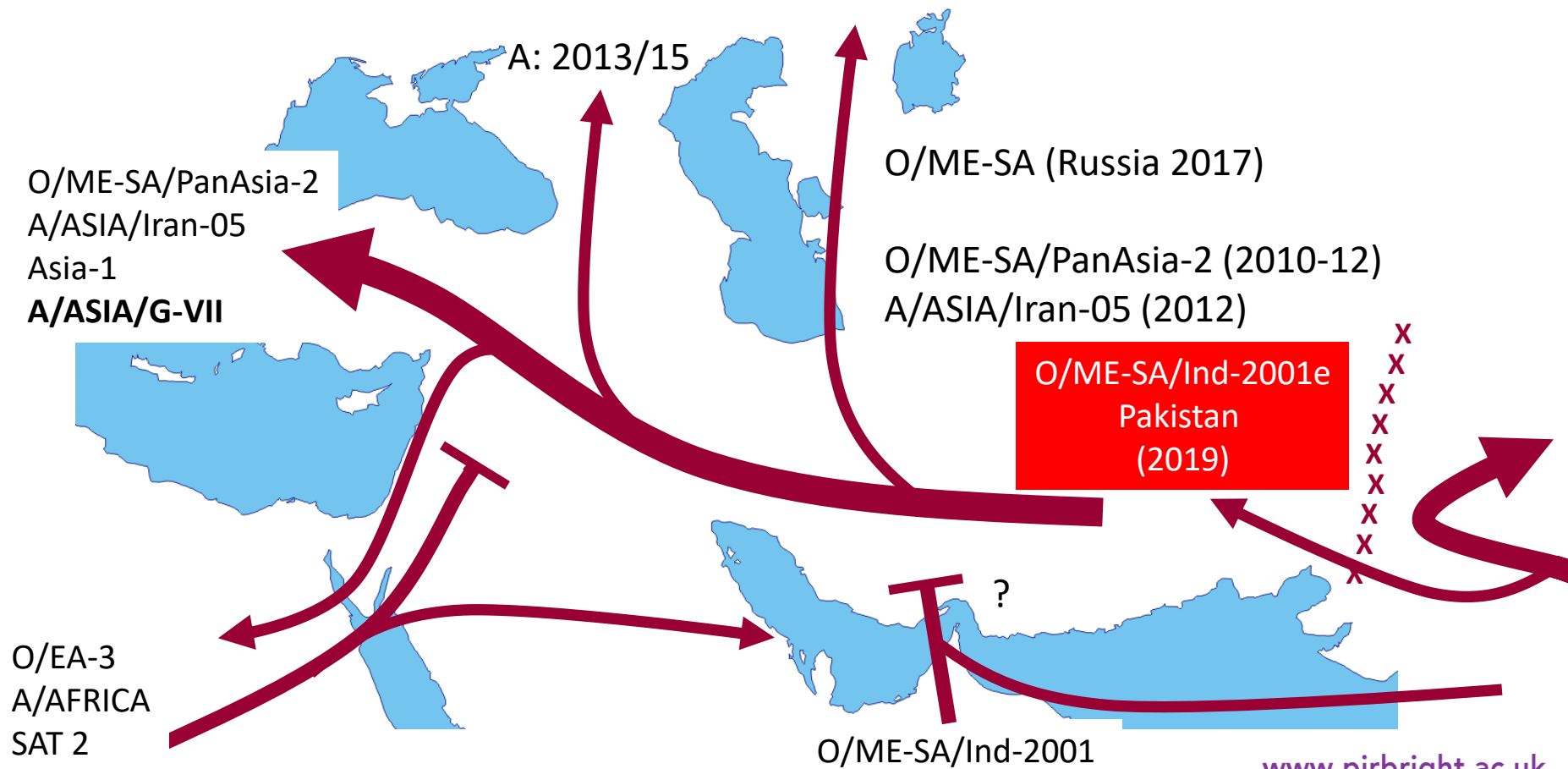
ARRIAH – 50%
match to isolates
from Pakistan

- Reinforces the importance of good quality vaccines, booster regime with good coverage in target host populations

Risk pathways

Simplified summary and conjectured routes by which FMDV spreads

- Understanding transmission pathways helps identify future FMDV lineages that threaten the region



Talk summary



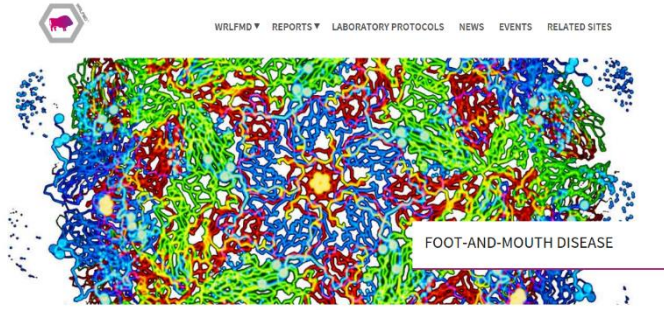
- New incursion of O/ME-SA/Ind-2001e into Pakistan
- First detection in a West Eurasian hub-country with potential for onward spread
- Sampling of field outbreaks is critical
- Importance of an active FMD Reference Laboratory Network to facilitate sample collection from FMD outbreaks in the field– to feed real-time lab data back to FMD control programmes

WRLFMD and the OIE/FAO Lab Network welcome sample submissions from member states

- **Testing of clinical samples is free of charge**
- **Contact: donald.king@pirbright.ac.uk**
- A wide range of FMD vaccines are used in the region (including those from local sources, India etc.. that are not described) and there are opportunities to establish improved approaches to allow post-vaccination responses to be measured and compared

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/>)



WRLFMD ▾ REPORTS ▾ LABORATORY PROTOCOLS NEWS EVENTS RELATED SITES

FOOT-AND-MOUTH DISEASE

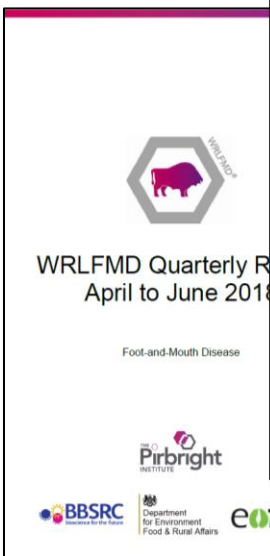
Welcome

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 >

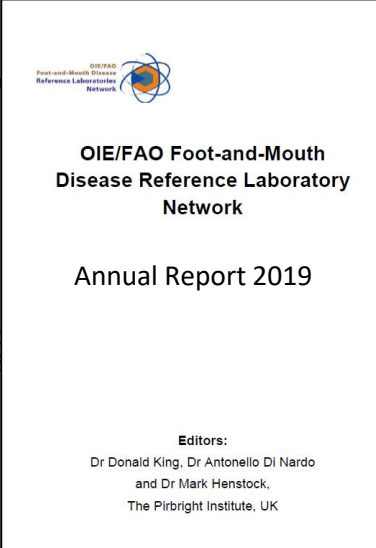


WRLFMD Quarterly Report
April to June 2018

Foot-and-Mouth Disease

Pirbright INSTITUTE

BBSRC Department for Environment Food & Rural Affairs eofmd



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

Annual Report 2019

Editors:
Dr Donald King, Dr Antonello Di Nardo
and Dr Mark Henstock,
The Pirbright Institute, UK

Acknowledgements

- Support for the WRLFMD and research projects
- Collaborating FMD Reference Laboratories and field teams
- Partners in Asia and within the OIE/FAO FMD Lab Network

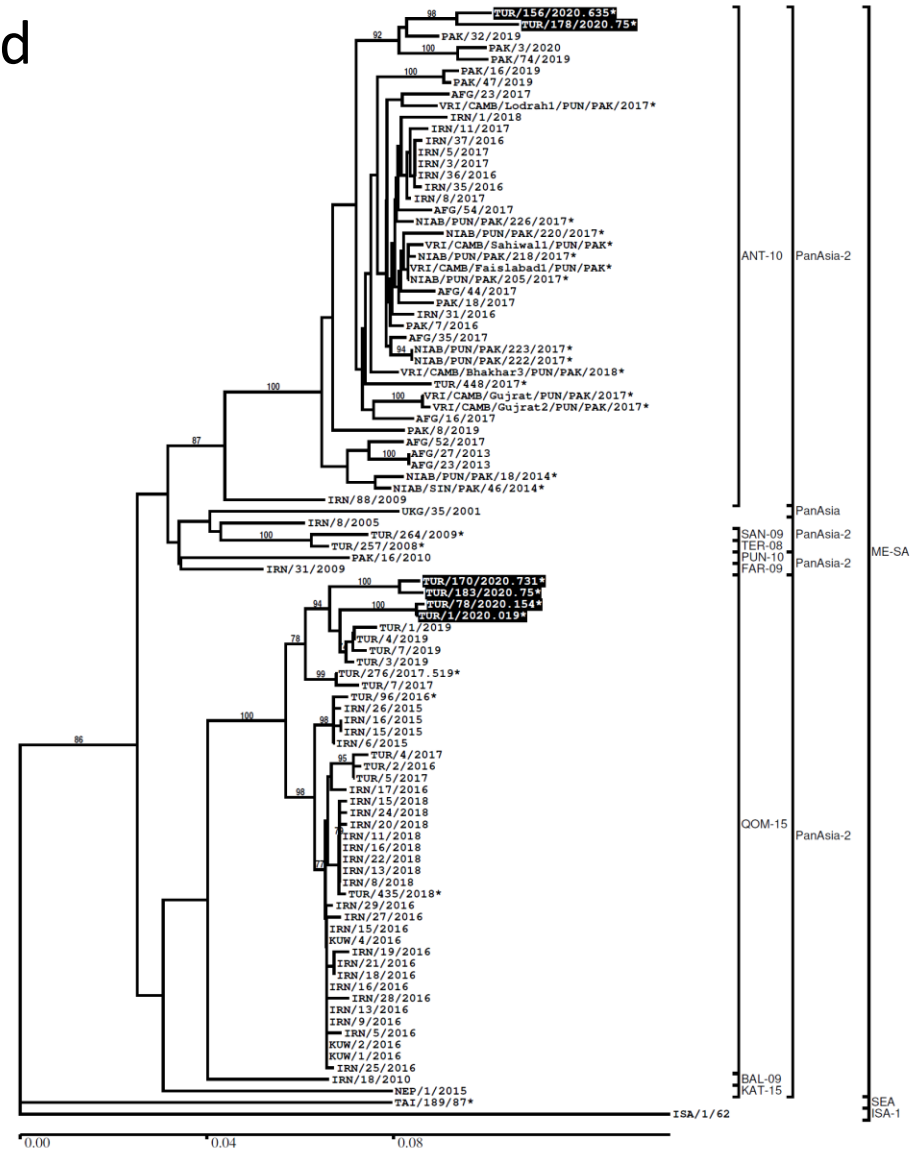


Department
for Environment
Food & Rural Affairs

eofmd

Two serotype O lineages in Turkey

- Six FMDV sequences provided by the ŞAP Institute, Ankara
- **O/ME-SA/PanAsia-2^{QOM-15}**
- Present 2018-19
- **O/ME-SA/PanAsia-2^{ANT-10}**
- Samples from Van, Tokat
- Previous incursions 2010, 2011, 2013 and 2017



New serotype A clade in Iran

Six VP1 sequences submitted by the CVL Iran Veterinary Organisation

FMD outbreaks in cattle – May-Oct 2020

A distinct genetic clade of A/ASIA/Iran-05^{FAR-11}

Request for samples for testing by vaccine-matching

