The Global System
OIE/FAO FMD Reference Laboratories Network: Activities and Directions
IAH, Pirbright, WRLFMD® -India 2012



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BBSRC bioscience for the future

WRLFMD

OIE

defra

Outline

- The network aims
- Members
- Activities
- Future work
- Where to for the network on global control

The OIE/FAO FMD Reference Laboratories Network

The Network of OIE/FAO FMD Reference Laboratories has been established with two principal goals:

1/ To understand global virus distribution and patterns and provide vaccine recommendations

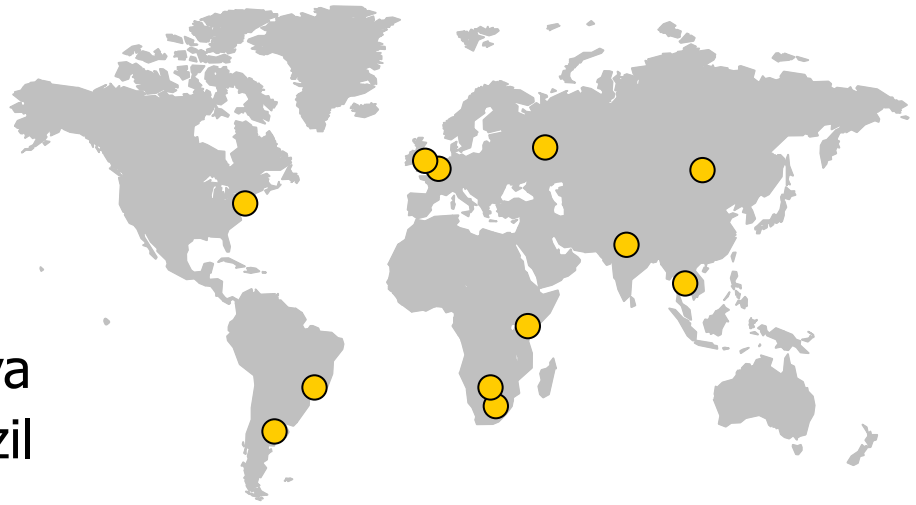
and

2/ To Improve the quality of laboratory testing carried out by international and national reference laboratories.

This requires sharing and joint evaluation of surveillance information from laboratory diagnosis, serotyping, genetic characterisation and vaccine matching tests and harmonisation of standards for diagnostic procedures.

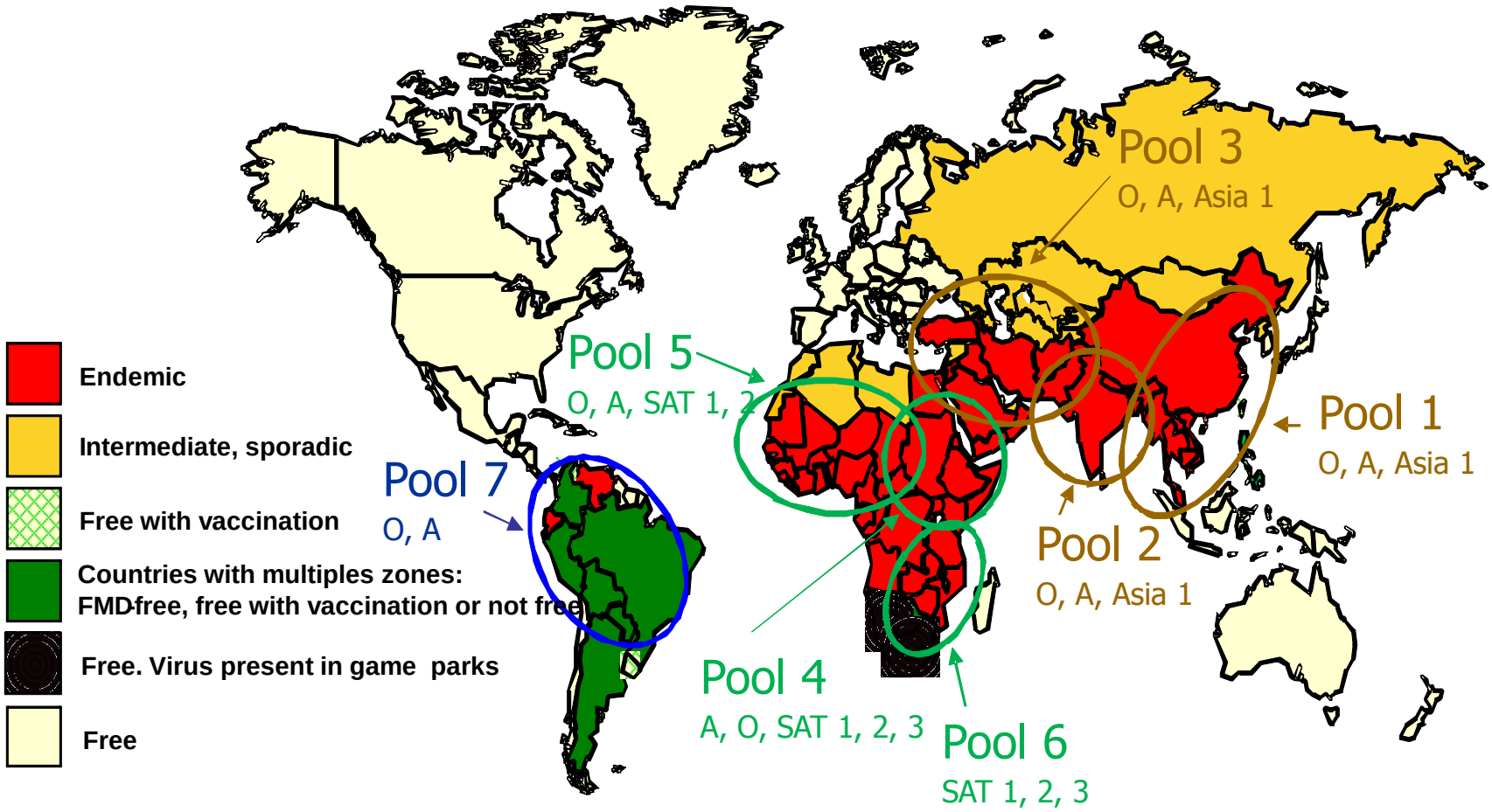
Members: OIE/FAO Lab network

- WRLFMD: Pirbright, UK
- RRLSEA: Pakchong, Thailand
- LVRI: Lanzhou, China
- FGI ARRIAH: Vladimir, Russia
- PDFMD: Mukteswar, India
- RRLSSA: Gabarone, Botswana
- FMD-Laboratory: Embakasi, Kenya
- PANAFTOSA: Rio de Janeiro, Brazil
- LFADLCT: Argentina
- ARC-OVI: Onderstepoort, RSA
- PIADC: Plum Island, USA
- CODA-CERVA-VAR: Ukkel, Belgium



Approximately ~2300 samples tested during 2010

Conjectured Status of FMD



Pool positions are approximate and colours indicate that there are three principal pools, two of which can be subdivided into overlapping areas

Each pool may need tailored vaccines and strategies

Samples and virus isolates made by region in 2010.

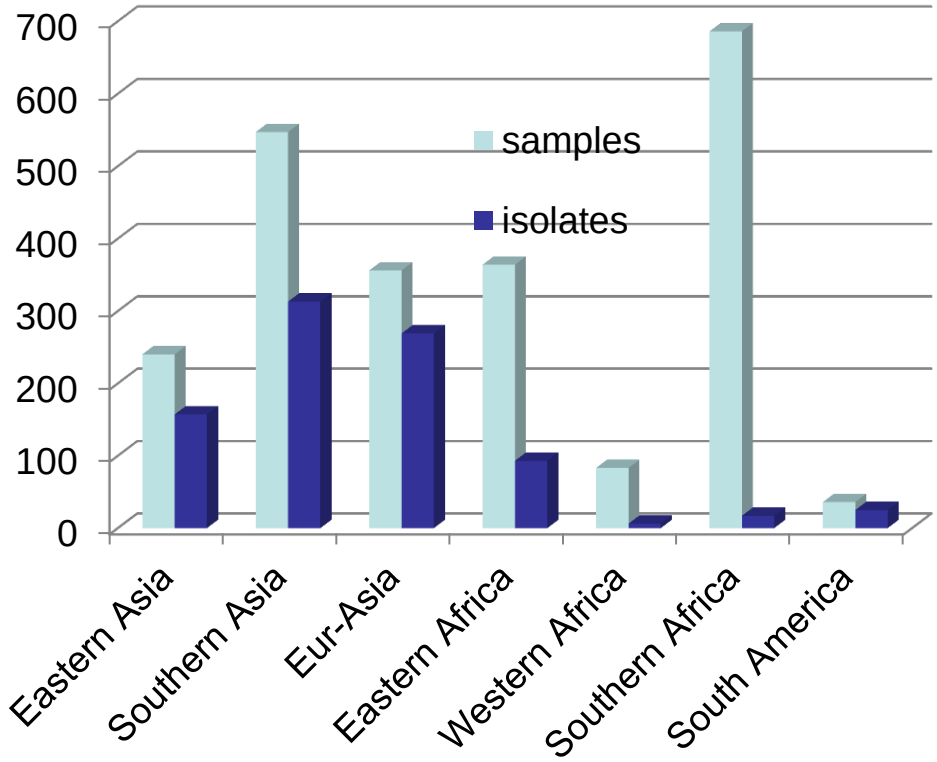
OIE/FAO FMD Reference Laboratory Network

Annual Report 2010

Editor: Dr Jef Hammond, IAH, Pirbright, UK.

38 different countries submitted 2,338 samples to OIE/FAO FMD Network Laboratories

	Collected in 2010		Collected earlier	
Laboratory	Samples	Countries	Samples	Countries
WRLFMD	760	26	458**	14
PANAFTOSA	10	1		
FGI-ARRIAH	15	4		
RRLSSA	24	3		
ARC-OVI	642	10		
PIADC-FADDL	5	1		
LVRI	34	1		
PDFMD	244	1		
RRLSEA	98	4	10*	2
LFADLCT	22	1		
	1854	52#	468	16#



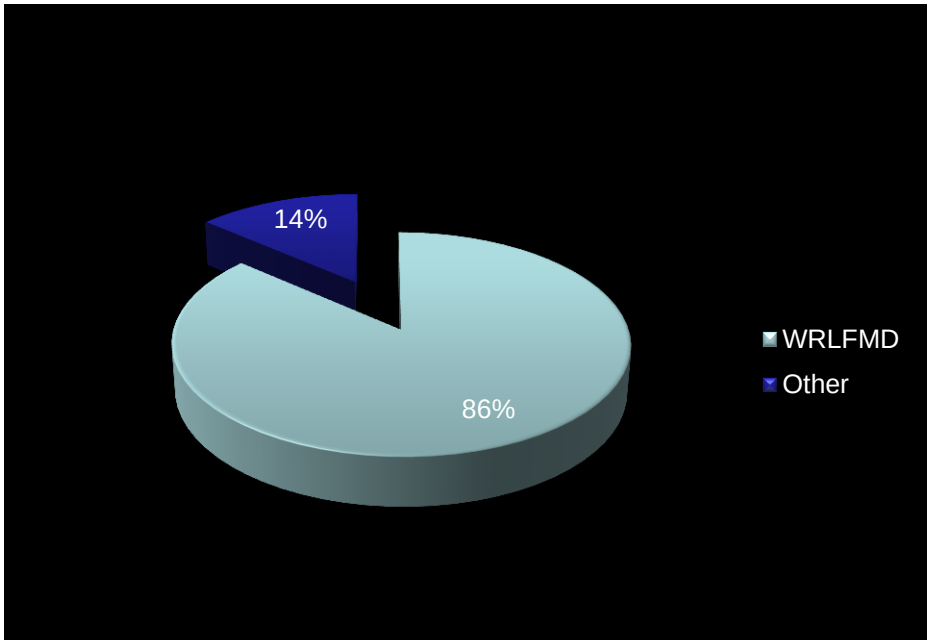
2010 - serotypes C and SAT 3 not detected; Asia 1 only in India

2011 – serotype Asia 1 epidemic in Middle East

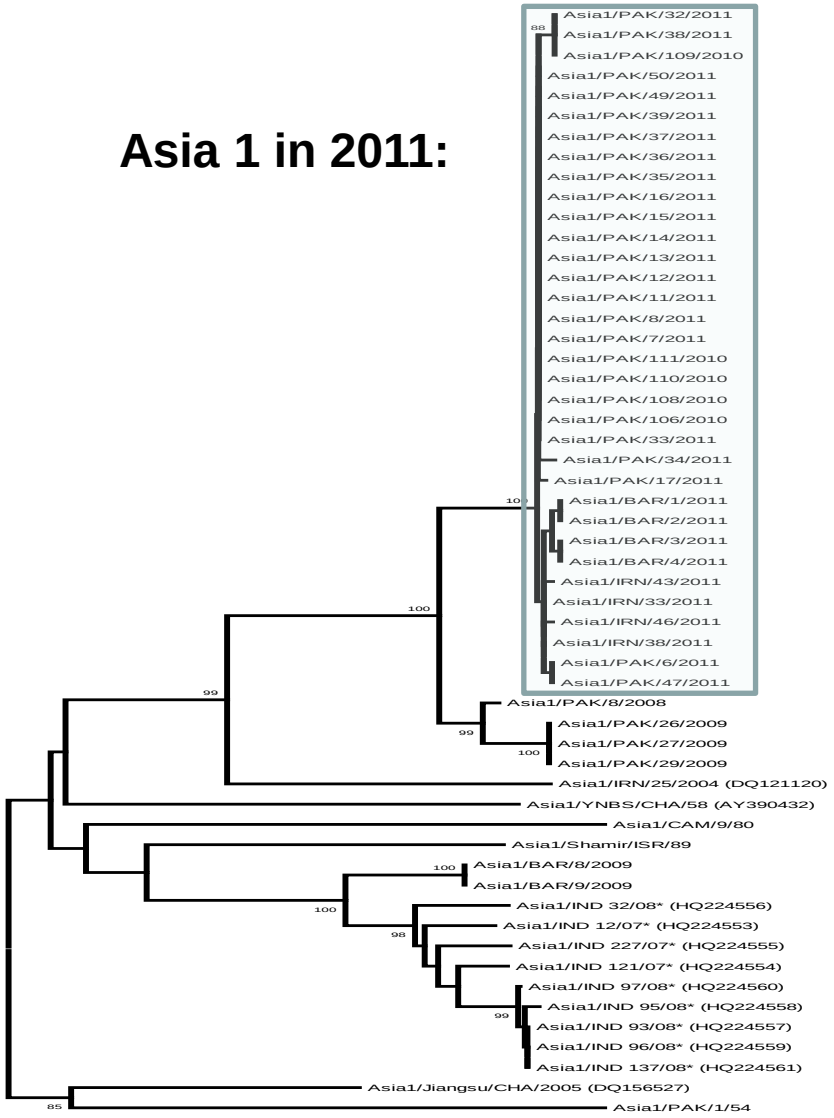
Network outputs- VP1 sequence analysis

750 VP1 sequences generated in 2010

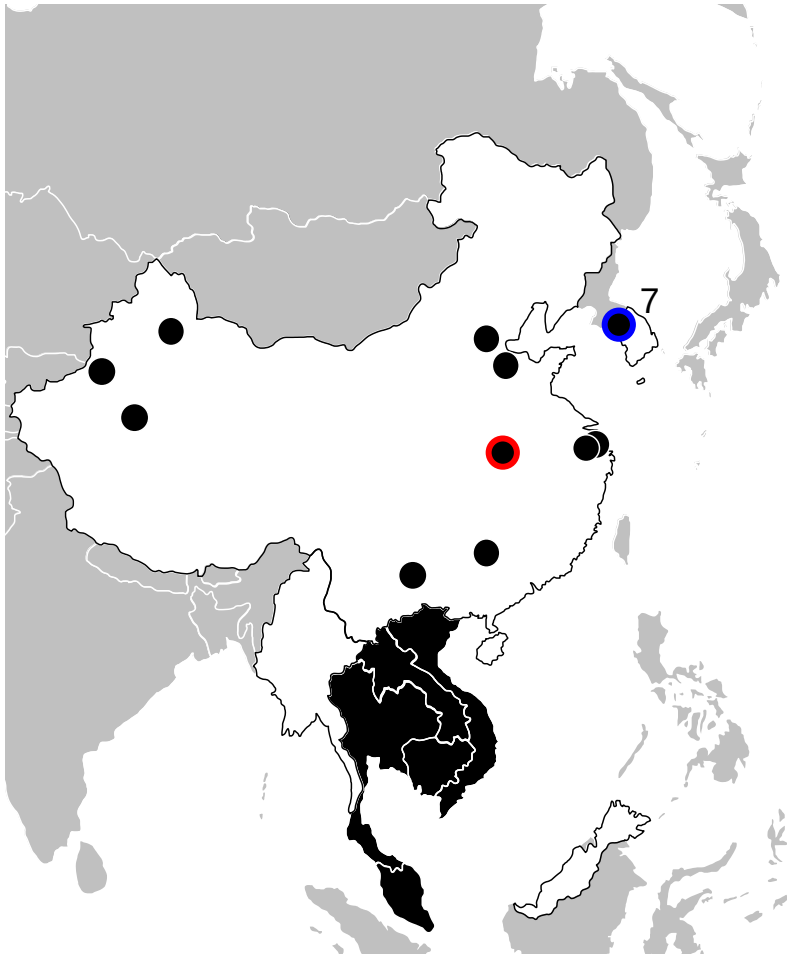
648 (86%) from WRLFMD

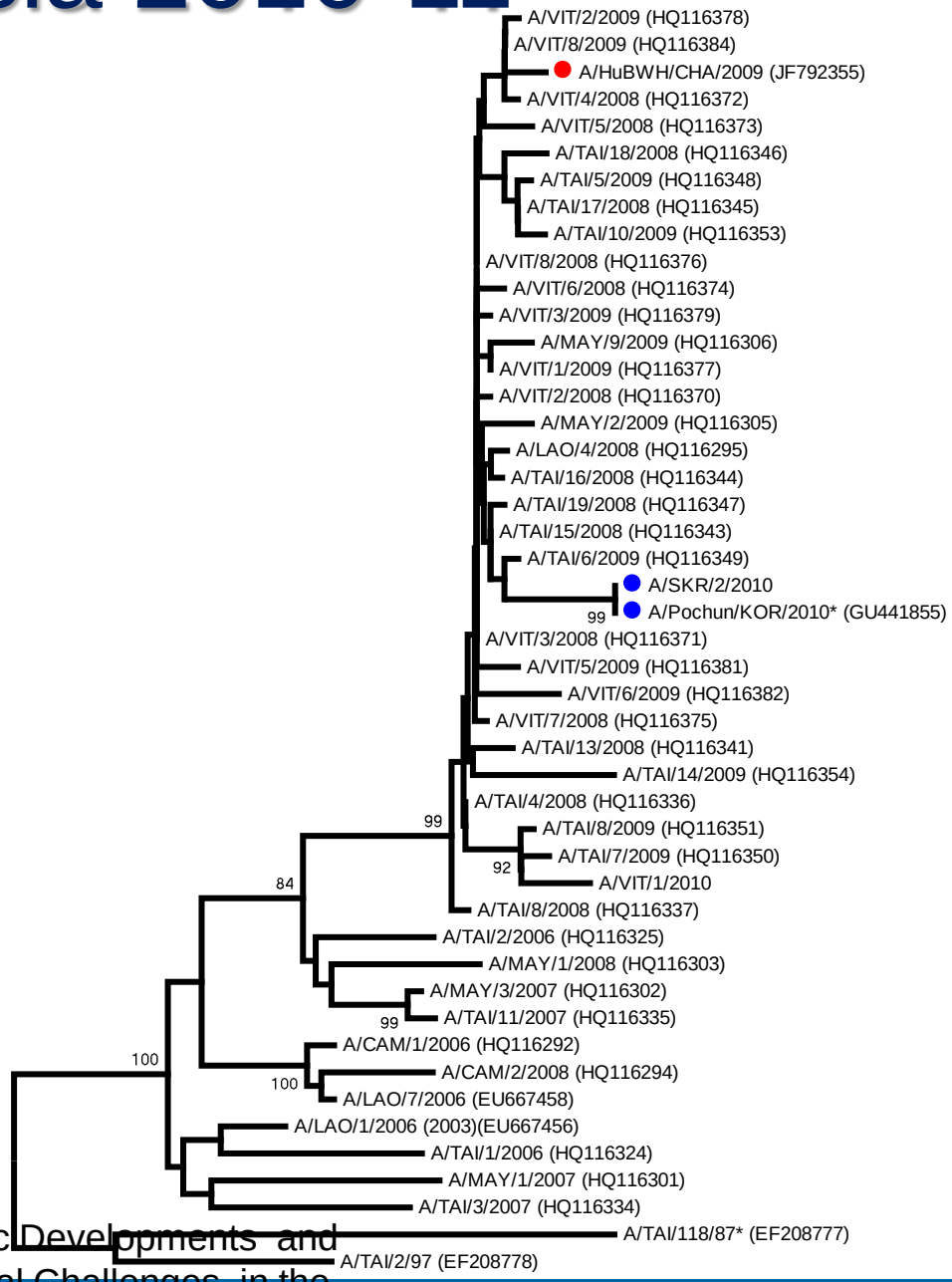


Asia 1 in 2011:



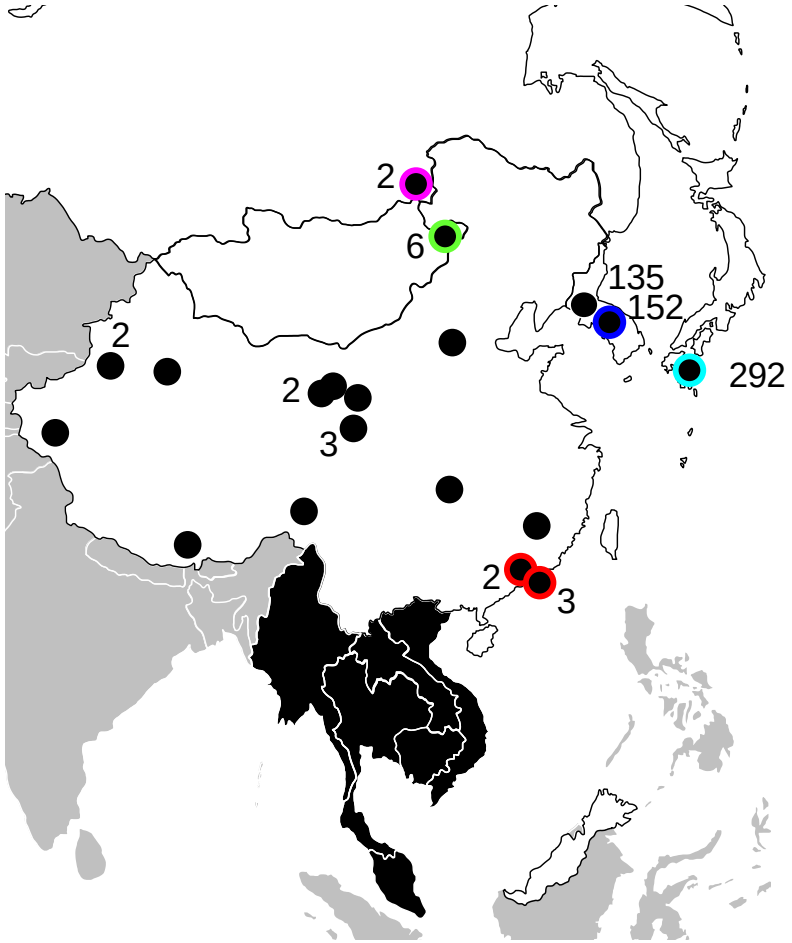
East Asia 2010-11

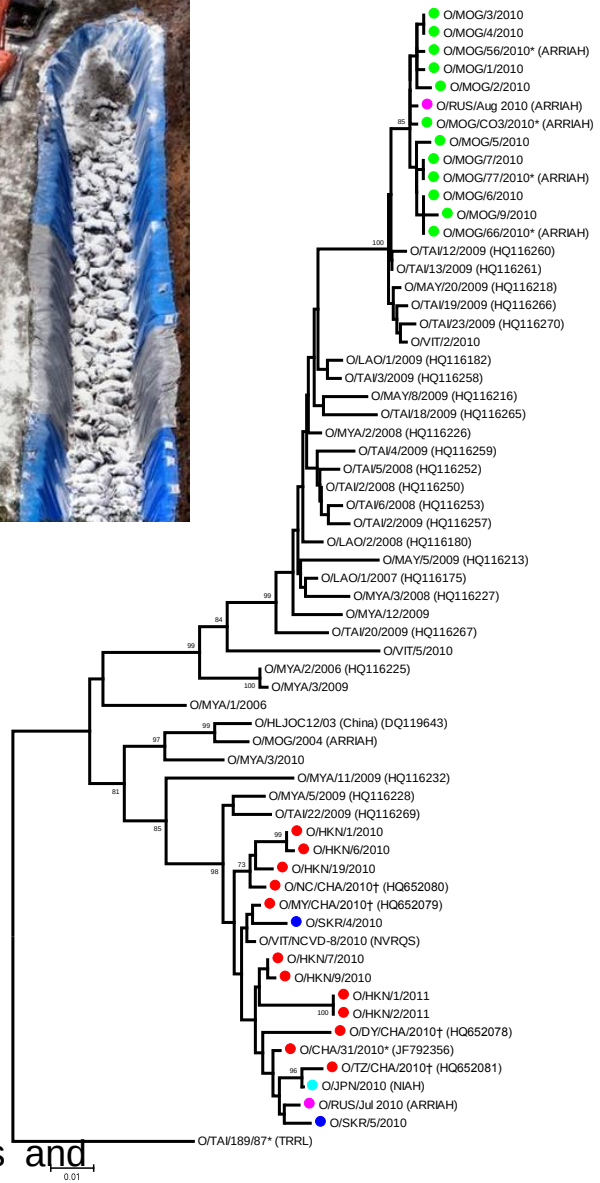




2009-2010: A/ASIA/SEA-97

East Asia 2010-11

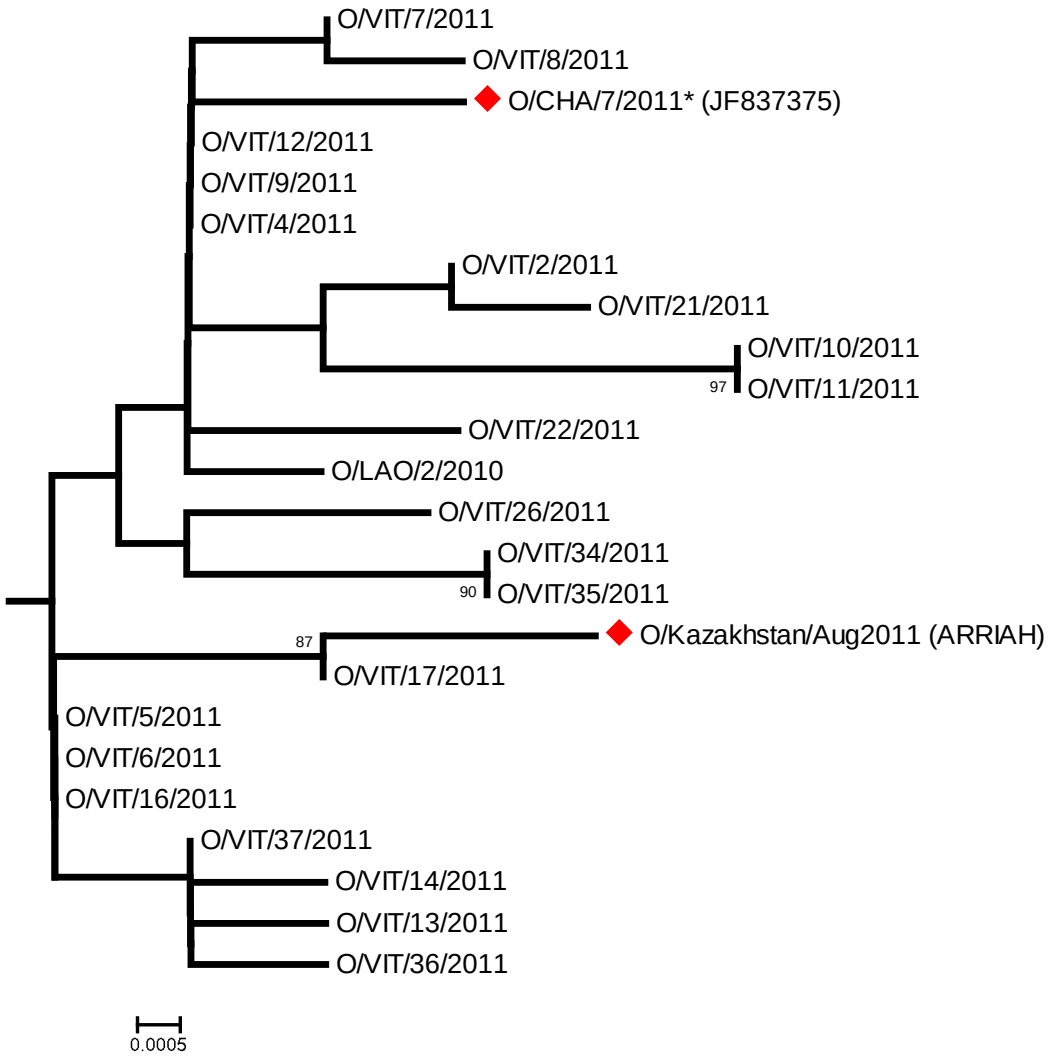




2010-2011: O/SEA/Mya-98

Recent incursions - E Asia

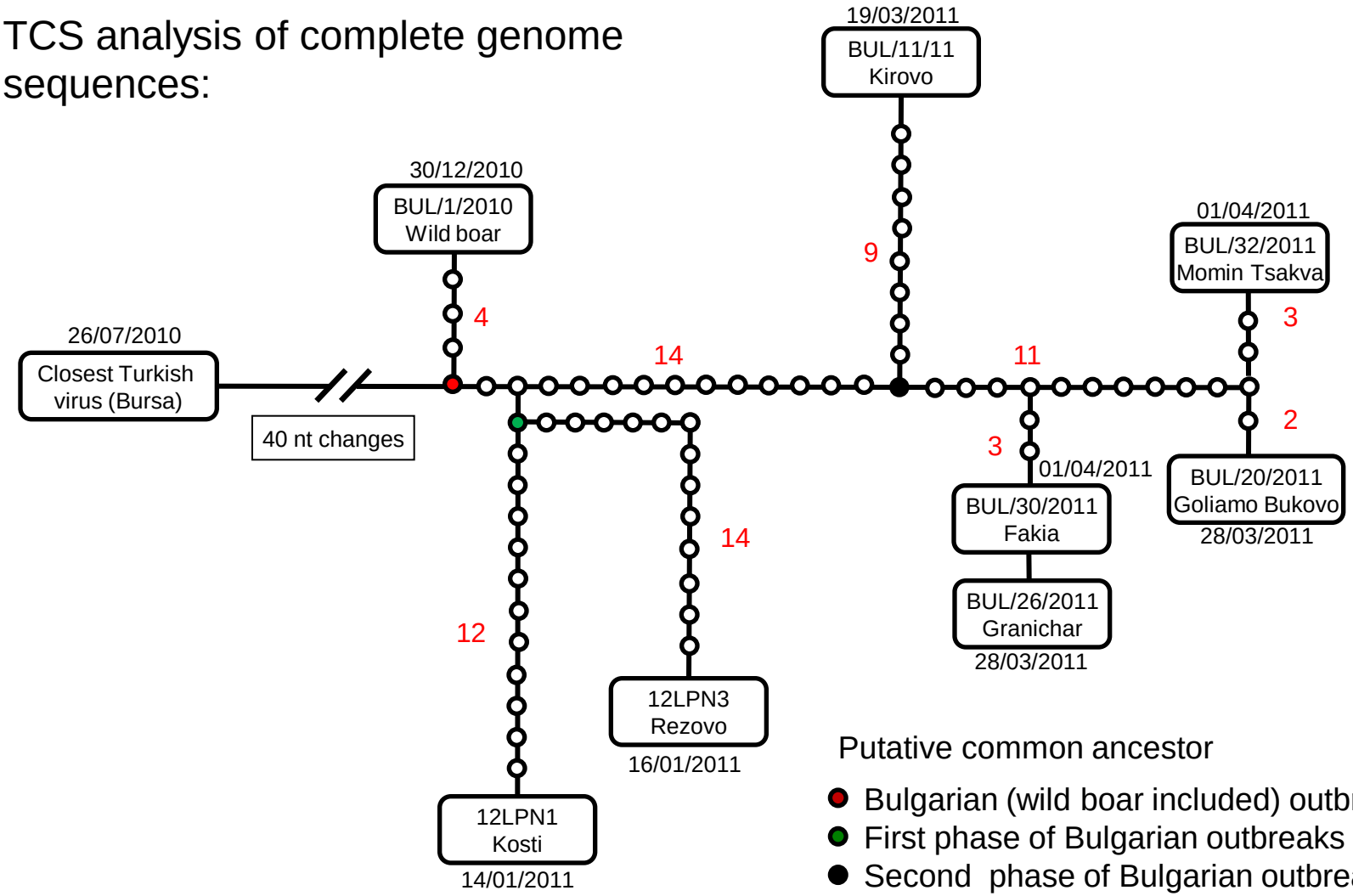
2011: O/ME-SA/PanAsia



Full genome analysis

Data Generated by IAH-Pirbright and DTU-Lindholm

TCS analysis of complete genome sequences:



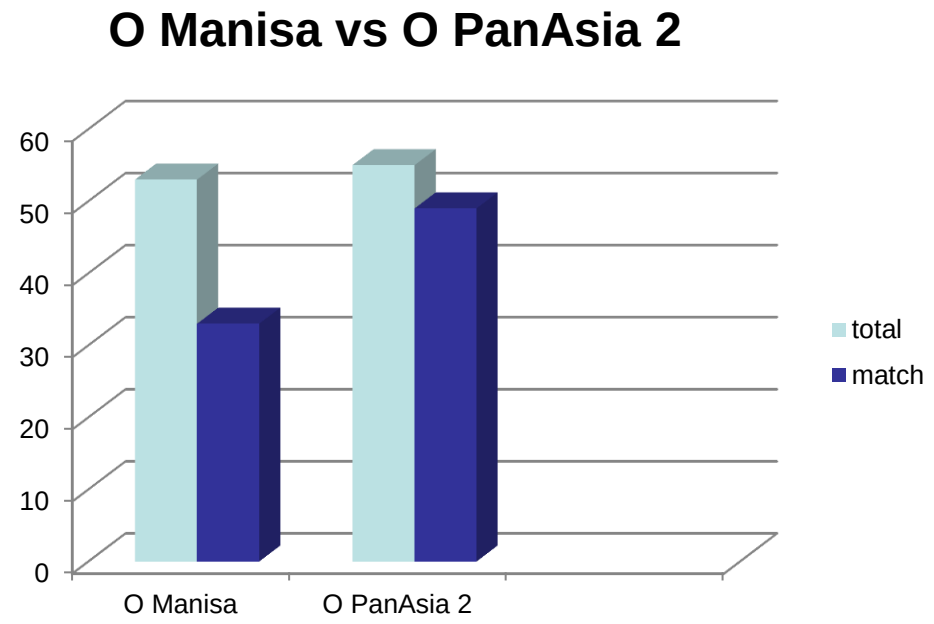
Putative common ancestor

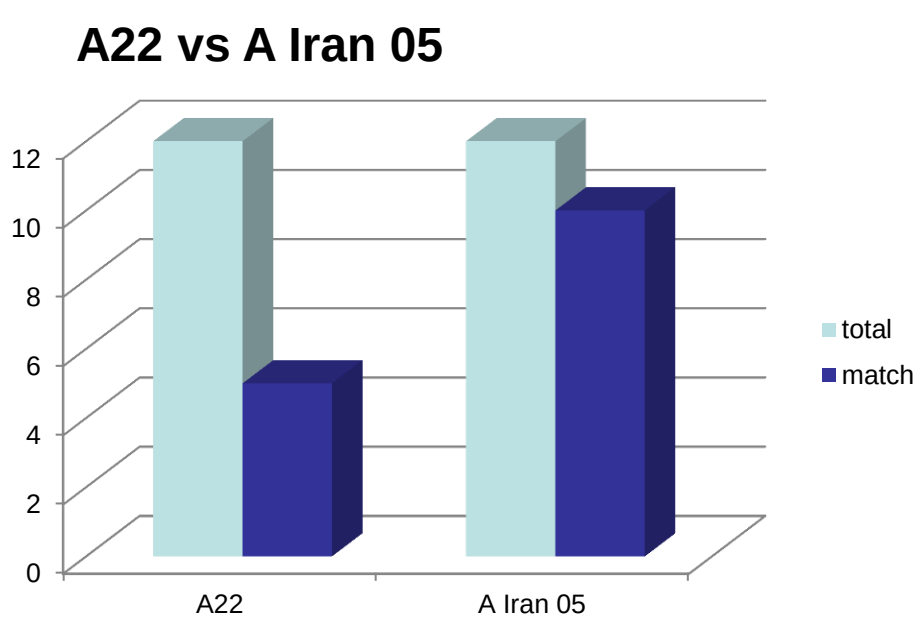
- Bulgarian (wild boar included) outbreaks
- First phase of Bulgarian outbreaks in livestock
- Second phase of Bulgarian outbreaks in livestock

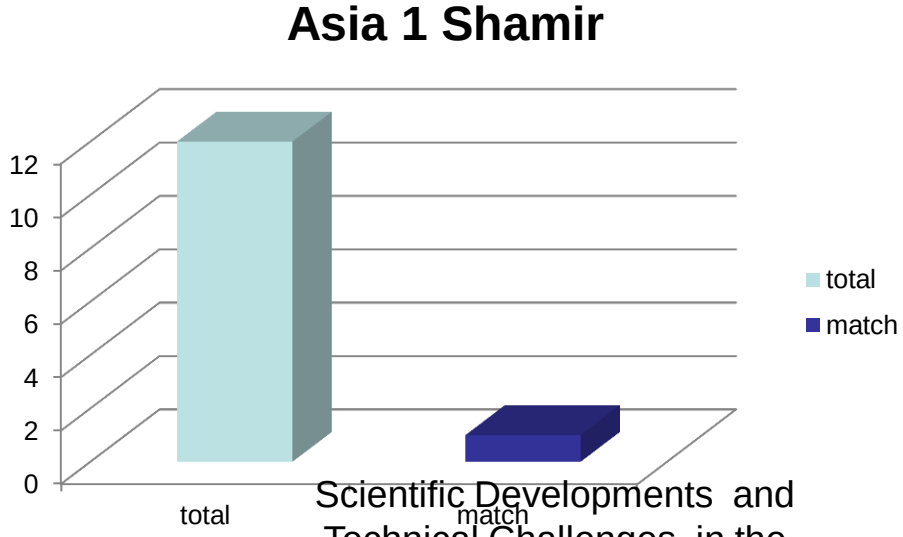
Vaccine Selection

- OIE/FAO FMD Reference Laboratory Network
- FMD Vaccine Bank Holders Network

Vaccine matching by VNT 2011







Outputs

Current

- Detailed analysis of virus
  - Origin
  - Serotype, genotype, strain
  - Possible source
  - Vaccine matching by serology
  - Animal experiments
- Detailed reports

Progress

- Complete genome analysis
- P1 sequence analysis and epitope mapping

Next steps

- Estimating weight of infection from molecular epidemiology
- Combine data from all inputs to provide a more comprehensive analysis
- More consideration of vaccine potency in strain selection

Network Activities:
Harmonisation of Vaccine Matching Tests for Network Laboratories 2008-2011

Process:

•Coordinated by WRLFMD – 11 labs in total

•Live (for VNT) and inactivated viruses and rabbit, guinea pig (for LPBE) and bovine sera provided from WRLFMD to each lab

•Instructions, reporting templates and protocols for all tests provided from WRLFMD

•Participants asked to test the samples for "r_1" values using their 'in-house' protocols and those provided from WRLFMD

Harmonisation of Vaccine Matching Tests for Network Laboratories

Findings:

- VNT: 4 out of 8 labs gave the same results for all 9 viruses.
- LPBE : 3 out of 4 labs gave similar results

Contributing factors for differences

- Cells and systems are different
- Interpretation of CPE is different
- Blocking regents for ELISA are different
- Not all labs repeat tests

- <u>Further work needed to harmonise assays</u>

Network Activities:

The 1st OIE/FAO FMD Reference Laboratories Vaccine Matching Technology Training Workshop

Institute for Animal Health, Pirbright,

7-11 November 2011

- Hands-on experience with both the VNT and LPBE for FMD vaccine matching studies and subsequent data analysis.

- An opportunity for participants to exchange views on technique issues and have broad informal discussions on key issues and concerns relating to vaccine matching and diagnostic tests

Participants: Russia, Thailand, Nigeria, Kenya, Botswana, Belgium, Germany

Harmonisation of Vaccine Matching Tests for Network Laboratories

Future work

- Next Inter-laboratory matching exercise in 2012
  - Vaccine challenge test at Pirbright in Feb 2012
  - Asia 1 Shamir vaccination followed by heterologous Asia 1 TUR 2011 virus challenge.
    - BVS at 21dpv will be collected and pooled.
    - Panel of 3-4 field viruses including the challenge virus with a range of high, medium and low r_1 values will be prepared and distributed to network labs.
    - r_1 values will be generated by each lab and compared with one another and with the *in vivo* protection results/PD_{50}
- A second FMD vaccine matching training course will be organised

Network Activities: OIE/FAO FMD Reference Laboratories Meeting- November 2011 IAH, Pirbright- Major issues identified

- FMD global problem
  - Some information gaps - lack of sampling and of exchange
  - Much of the work reported by the network comes through Pirbright WRLFMD
  - How can we divide workload especially with an expected increasing workload following Bangkok meeting?

- Regional labs to identify where they might increase throughputs
  - Screening samples
  - RT PCR- serotype specific?
  - Ag ELISA and use of LFDs
  - VP1 or P1 sequencing
  - Training/reagent supply

- Vaccine matching comes up repeatedly as a problem area
  - Reagent access
  - Methodologies and Interpretation
  - Delivery of results and advice to decision makers
  - Need to address this as a network of experts

Network Workplan for 2012

- Prepare network report for 2011
- Collate and publish vaccine matching harmonisation work
- Prepare a presentation on role of network for the Bangkok meeting
  - Labs to identify areas for potential increase in throughputs and requirements to do so
- Set up subgroups to carry out specific tasks identified

Workplan for 2012

- Subgroup 1: Carry out comprehensive review of **vaccine matching**
  - Literature
  - Methodologies
  - Interpretation
  - Prepare report for the next network meeting

- Subgroup 2: Vaccination and assessing **herd immunity**
  - Tests and sampling strategy
  - Quality of vaccine
  - Prepare report for the next network meeting

- Subgroup 3: **Training/reagents needs**
  - Current state of Proficiency testing for FMD diagnosis and vaccine matching
  - Prepare report for the next network meeting

- 6 month review of progress- possibly during Bangkok meeting 2012

- The 2012 network meeting should focus on these actions and the outcomes of the Bangkok meeting

Global Activities for Network

- What roles for Network in Global control plan?
- We can offer
    - regional focus
    - knowledge and experience
    - training
    - coordination through networks

Resourcing Issues to be Addressed

- Increased workload- samples
- Increased demand for
  - Training
  - Proficiency testing
  - Accreditation
- Ref Labs need to receive dedicated funding from the Global initiative

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

www.wrlfmd.org

- The network provides the basis for a global *'real time virus map'* for the implementation of better informed control measures for FMD

- A major combined effort both National and Global is needed for control

- The FMD Reference Laboratory Network is the Engine Room of the Global Control Initiative