The Global Situation of Foot-and-Mouth Disease Occurrence

An Overview

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Talk Overview

- Introduction to WRLFMD
- FMD situation update
- Global Control through Regional Knowledge
- Other activities
- Future Issues and Gaps
Principal Activities of WRLFMD

OIE Reference Laboratory
FAO World Reference Laboratory

- 24/7 Diagnostic Service
  - Referral diagnosis
- Global surveillance
- Sequence analysis and strain identification
- Test development, improvement and validation
- Quarterly and Annual reports
Principal Activities of WRLFMD

- Quality assurance
- Reagent and kit supply
- Training
- Consultancy and research priorities
- Reference laboratory
- Network co-ordination
- Proficiency testing
- Advice
The WRLFMD website contains quarterly and annual reference laboratory reports and can be found at http://www.wrlfmd.org/ref_labs/fmd_ref_lab_reports.htm
WRLFMD: 1250 samples from 37 countries
October 2006 - 2008

AFGHANISTAN
BHUTAN
CAMBODIA
KYRGYZSTAN
LAOS
PAKISTAN
THAILAND
VIETNAM
MALAYSIA
NORTH KOREA

AFRICA: 14
NAMIBIA
NIGERIA 1984-5
SOMALIA 1983
SUDAN
UGANDA
ZAMBIA

MIDDLE EAST: 8
BAHRAIN
IRAN
ISRAEL
JORDAN
KUWAIT
SAUDI ARABIA
UAE
YEMEN

EUROPE: 5
UK
TURKEY
MALTA
ITALY (SVD)
PORTUGAL (SVD)

AFRICA
MIDDLE EAST
EUROPE
ASIA

TOTAL: 1250 samples from 37 countries
523 FMD Viruses Isolated Between October 2006-2008

- **O**: 382
- **A**: 84
- **SAT 1**: 44
- **SAT 2**: 2
- **Asia 1**: 11
WRLFMD: 330 Viruses Sequenced (VP1) 2007-2008

- O: 194
- A: 69
- SAT 1: 14
- SAT 2: 51
- Asia 1: 2
2009

• Very high numbers of samples submitted to WRLFMD

• Middle East Region

• Increase in A serotype

  A-Iran-05 lineage

  O-PanAsia 2
WRLFMD Number of positive samples
1st quarter 2008 vs 2009

2008 ~50

Bahrain: 3
Ethiopia: 10
Kuwait: 10
Pakistan: 25
Saudi Arabia: 7
WRLFMD Number of positive samples
1st quarter 2008 vs 2009

2008: ~50 positive samples
2009: >300 positive samples

187 positive samples in total in 2008
>450 samples in 1st quarter 2009
FMD Reports in 2009

Southern/Southeast Asia
- China Asia 1 & A
- Taiwan O
- Chinese Taipei O
- Hong Kong O
- Thailand O
- Myanmar O

Central Asia
- Pakistan O, A & Asia 1

Africa
- Angola SAT2
- Botswana SAT2
- Kenya O, A, SAT1 & SAT2
- Ethiopia O & A
- Zambia SAT1 & SAT2
# FMD Reports in 2009

## Southern/Southeast Asia
- China: Asia 1 & A
- Taiwan: O
- Chinese Taipei: O
- Hong Kong: O
- Thailand: O
- Myanmar: O

## Central Asia
- Pakistan: O, A & Asia1

## Africa
- Angola: SAT2
- Botswana: SAT2
- Kenya: O, A, SAT1 & SAT2
- Ethiopia: O & A
- Zambia: SAT1 & SAT2

## Middle and Near East
- Bahrain: A & Asia1
- Egypt: O & A
- Iran: A
- Iraq: A
- Israel: O & A
- Kuwait: A
- Lebanon: A
- Libya: A
- Sudan: O
- Turkey: O & A
- UAE: O
- Yemen: O
FMDV-O genotyping in 2008 & 2009
Sub-lineages of A-Iran-05

A-Iran-05
- A-Iran-05_<sub>ARD</sub>-07: Turkey 2007-2009
- A-Iran-05_<sub>EZM</sub>-07: Turkey 2007-2009
FMD Outbreaks in 2009

- Egypt: O & A
- Sudan: O
- Kuwait: A
- Lebanon: A
- Turkey: O & A
- United Arab Emirates: O
- Libya: A
- Iran: O & A
- Israel: O & A
- Iraq: A
- Bahrain: A & Asia1
- Syria: A
- Iraq: A
- Lebanon: A
- Kuwait: A
- Jordan: A
- Egypt: O & A
- Syria: A
- Iran: O & A
- Iraq: A
- Bahrain: A & Asia1
- Turkey: O & A
- United Arab Emirates: O
- Libya: A
- Iran: O & A
- Israel: O & A
- Lebanon: A
- Jordan: A
- Egypt: O & A
- Syria: A
- Iraq: A
- Bahrain: A & Asia1
- Syria: A
- Iraq: A
- Iran: O & A
- Egypt: O & A
- Sudan: O
- Yemen: A
- Ethiopia: O & A
- Botswana: SAT2
- Zambia: O, A, SAT 1 & SAT 2
- Kenya: O, A, SAT 1 & SAT 2
- Honk Kong: O
- UA Emirates: O
- Senegal: No type
- Botswana: SAT2
- Myanmar: O
- Thailand: O
- Honk Kong: O
- Senegal: No type
- Botswana: SAT2
- Myanmar: O
- Thailand: O
- Honk Kong: O

22 countries ~700 samples
FMD Outbreaks in 2009

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Intermediate, sporadic
Endemic
FMD - Free
Free. Virus present in game parks
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Global Control through Regional Knowledge

If We Divide the Globe into 7 pools each with:

- Multiple serotypes but topotypes mainly confined to that pool
Visualization of Regional Virus Pools as an Aid to Global Control

3 pools covering Europe, Middle-East and Asia
3 pools covering Africa
1 pool for the Americas
Global Control through Regional Knowledge

If We Divide the Globe into 7 pools each with;

- Multiple serotypes but topotypes mainly confined to that pool
- If vaccination is to be a major tool then each pool may need tailored vaccines
  - currently, there is an asymmetry of effort to identify vaccines (little information for west and east African pools)
- This approach requires that each pool needs support for typing and vaccine matching
What Do We Know So Far In 2009?

3 pools covering Europe, Middle-East and Asia
3 pools covering Africa
1 pool for the Americas

- Pool 1: O, A & Asia
- Pool 2: O
- Pool 3: SAT1 & SAT2
- Pool 4: O, A, SAT1 & SAT2
- Pool 5: SAT1 & SAT2
- Pool 6: SAT1 & SAT2
- Pool 7: ?

OIE Reference Laboratories And Collaborating Centres
FAO Additional Reference Centres
Regional/National Reference Centres
What do we know so far in 2009?

- 3 pools covering Europe, Middle-East and Asia
- 3 pools covering Africa
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Pool 3
- Bahrain
- Lebanon
- Egypt
- Libya
- Iran
- Pakistan
- Iraq
- Sudan
- Israel
- Turkey
- Kuwait
- UAE
- Yemen

O, A & Asia 1

3 pools covering Europe, Middle-East and Asia
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More Detailed Breakdown of Regional Pools

Label Nomenclature

SEROTYPE\textsuperscript{TOPOTYPE} (Strain)

WRLFMD disclaimer: The virus pool boundaries are approximations and further data are needed to improve and more accurately define these regions
Pools 1 & 2: O, A & Asia 1

Map showing regions labeled Pool 1 and Pool 2 with various locations marked as OME-SA (PanAsia-2), ASIA1 (G-III), ASIA1 (G-IV), and OCATHAY.
Pool 3: O, A & Asia 1
Pool 4:
O, A, SAT 1, SAT 2 (& SAT 3?)
Pool 5:
O, A, SAT 1 & SAT 2
Pool 6:
O, A, SAT 1, SAT 2 (& SAT 3?)

Pool 6a
O, A, SAT 1, SAT 2, (SAT 3)

Pool 6b
SAT 1, SAT 2, (SAT 3)
Pool 7: O & A
Other Activities

- ISO 9001 and ISO 17025 Accreditation
- Training - Diagnostics and veterinary
- Interlaboratory proficiency tests for virus detection and serology
- OIE/FAO FMD Ref Labs Network - vaccine matching
- LFD penside test launched with Svanova and IZS-Brescia
- Major development work with Smiths detection on rapid field based PCR-BioSeeq
- Global FMD Research Alliance (GFRA)
The Need for a FMD Ref Lab Network

• To make available accurate and timely global surveillance information
  – Value of sharing information on transboundary diseases
  – Developing trust and shared vision through ongoing contact and joint programmes of work
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- Network goals
  - Understanding global FMD virus distribution and patterns in order to identify threats and make vaccine recommendations
  - Improving the quality of laboratory tests from international and national reference laboratories
  - Building up local capability in support of regional control programmes
Reference Laboratories and Collaborating Centres:
- Pirbright
- Rio de Janeiro
- Vladimir
- Gabarone
- Buenos Aires
- Onderstepoort
- Plum Island
- Brussels
- Lanzhou
- Mukteswar
- Pakchong
A Potential Vaccine Bank Network

- An international FMDV vaccine/antigen bank network would be beneficial in many ways
  - Exchange of technical know-how and information on strain selection and performance
  - Access to the vaccines/antigens in other banks could reduce the burden of stockpiling on individual members and increase the range of strains available
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- The administrative challenges to making this a reality are great
  - Constraints related to confidentiality, varying standards, conflicts of interest and complex administration
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Future Issues and Gaps

• Increase knowledge of circulating viruses in Africa
  – Lack of information on effective vaccine strains in Africa
  – Sequence and vaccine matching studies especially SAT2
  – Needs a comprehensive study on variation
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• Full length sequencing projects
  – Type A – Turkey/Iran
  – SATs - Africa
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- Vaccine Matching studies
  - Antigenic Cartography

- Next Generation Vaccines
Future Issues and Gaps

• Improve interactions and information sharing with other reference laboratories and industry
  – Network meetings and 2-way training visits
  – Better communication with vaccine manufacturers
  – Better communication with Government and decision makers

• Rapid field detection devices

• Improved field data- GPS coordinates
WRLFMD Summary

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  - Need for improved submissions from some regions
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- FMD activity increasing this year in Middle East

- Vaccine recommendations have been modified
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  - Need for improved submissions from some regions
- WRLFMD Provides a global ‘real time virus map’ for the implementation of better informed control measures for FMD
- FMD activity increasing this year in Middle East
- Vaccine recommendations have been modified
- WRLFMD offers its full support to the Global FMD Control Initiative
Vision for the New Pirbright