ISTITUTO ZOOPROFILATTICO SPERIMENTALE
DELLA LOMBARDIA E DELL'EMILIA ROMAGNA
"BRUNO UBERTINI"
ENTE SANITARIO DI DIRITTO PUBBLICO

Web training for CAREC countries 25th-26th November 2021

LA NOSTRA ESPERIENZA, LA VOSTRA SICUREZZA.

ELEMENTS OF STATUS FOR FOOT AND MOUTH DISEASE (FMD) – Free Status

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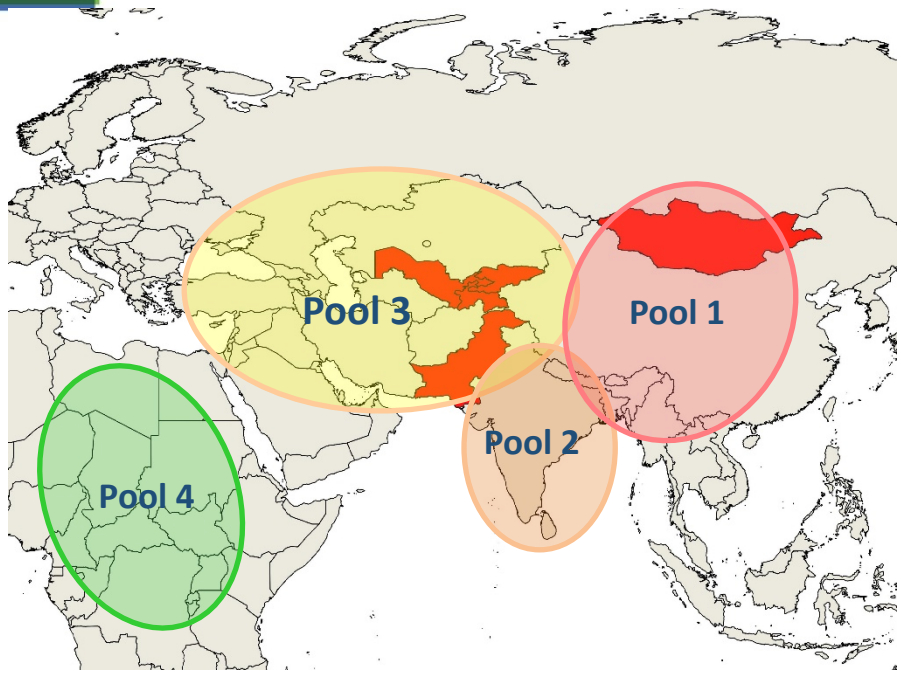
25th November 2021

Epidemiological situation in the region



Virus ecosystems (7 Endemic Pools) that maintain specific FMD virus strains - where FMD viruses spread between contiguous/neighbouring countries via established pathways

Kyrgyzstan, Pakistan, Tajikistan, Uzbekistan → Pool 3

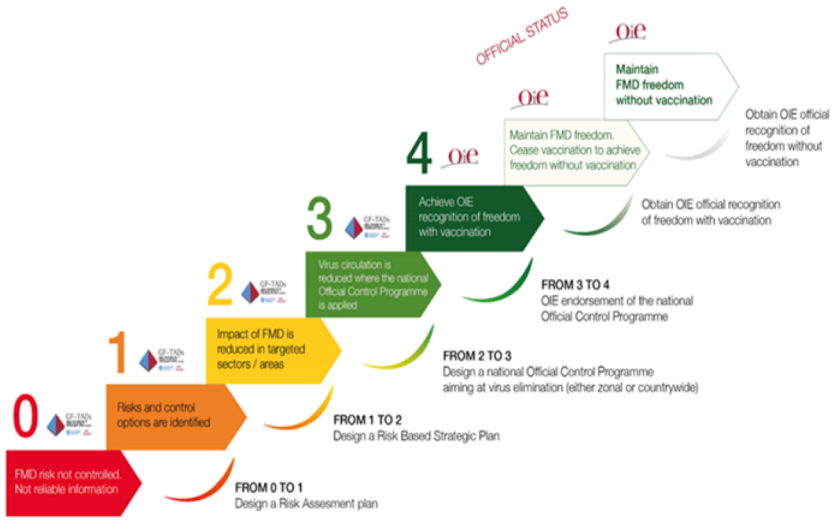
- ✓ FMDV type O (O/ME-SA/Pan Asia -2/ANT 10_ O/ME-SA/Ind-2001 incursion from Pool 2)
- ✓ FMDV type A (A/Asia/Iran-05)
- ✓ FMDV type Asia 1 (Sind 08)

Mongolia → Pool 1

- ✓ FMDV type O (O/ME-SA/Pan Asia_ O/SEA/Mya-98_O/ME-SA/Ind-2001_)
- ✓ FMDV type A (A/Asia/Sea-97)
- ✓ FMDV type Asia 1 (last reported outback in 2005)

CAREC countries

Kyrgyzs Republic, Mongolia, Pakistan, Tajikistan and Uzbekistan



PCP Stage 1 focus: «To gain an understanding of the epidemiology of FMD in country and develop a risk-based approch to reduce the impact of FMD»

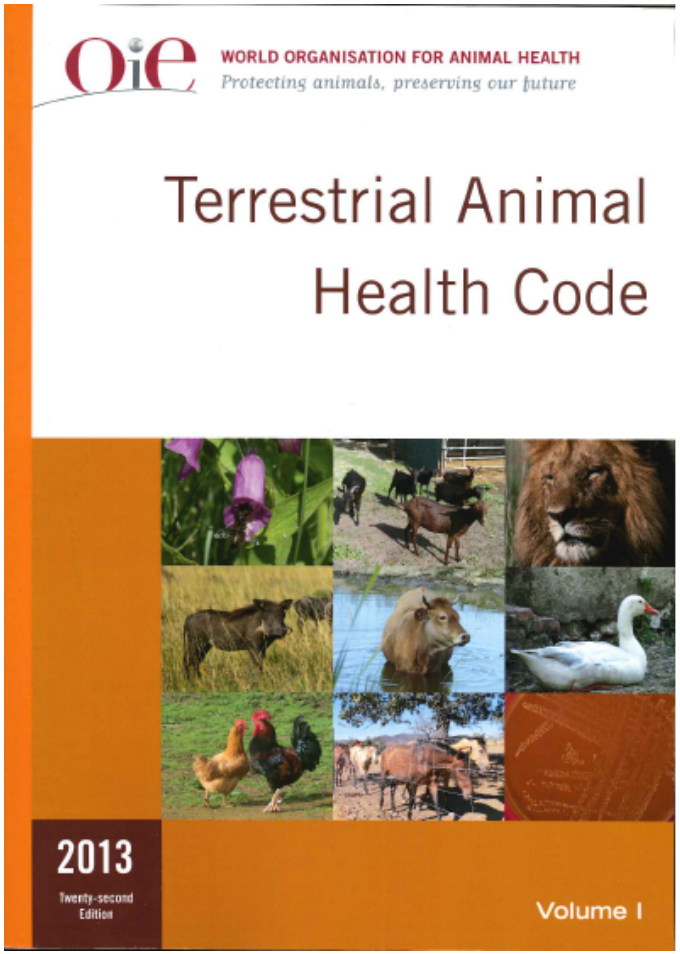
PCP Stage 2 Focus: «to implemet risk based control measure such that the impact of FMD is reduced in one or more livestock sectors and/or in one or more zones»

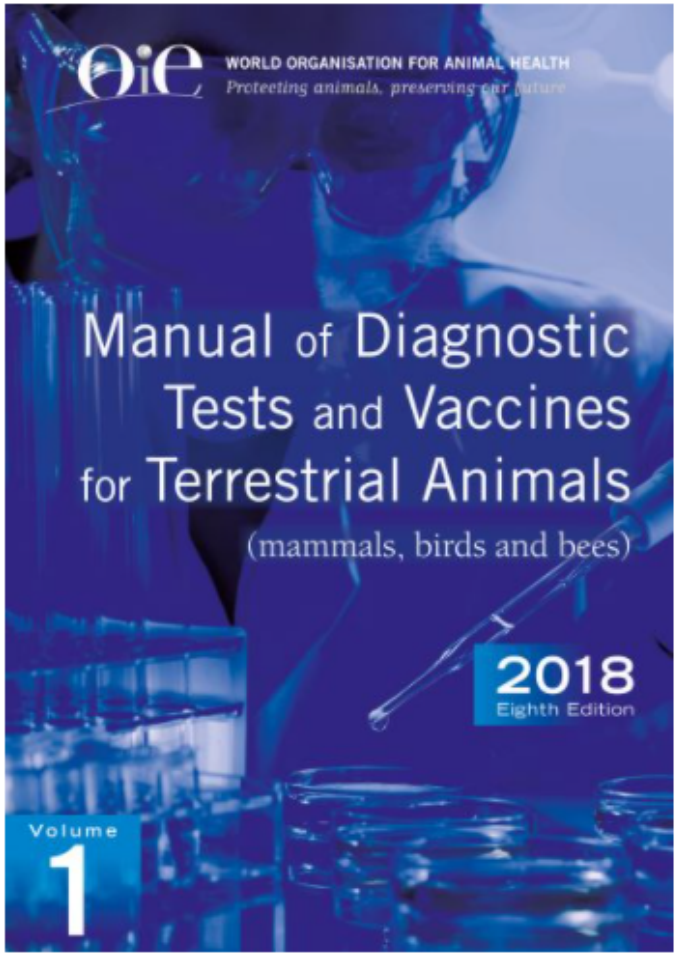
Application for Official recognition by the OIE Free status for FMDV

Country at PCP 4 → Apply for official status (OIE) «free WITH vaccination»

PCP 5 → obtained free status with vaccination, the next steps are aimed to achive official status (OIE) «free WITHOUT vaccination»

OIE standards and Giudeline





OIE - TERRESTRIAL ANIMAL HEALTH CODE

Application for official recognition by the OIE of free status for Foot and Mouth Disease

CHAPTER 1.11

ARTICLE 1.11.1

Country free from infection with FMDV where **vaccination is not practised**

ARTICLE 1.11.2

Country free from infection with FMDV where **vaccination is practised**

Infection with Foot and Mouth disease virus

CHAPTER 8.8

Article 8.8.1

3) The following defines the occurrence of infection with FMDV:
   - VI
   - Antigen / RNA
   - Antibodies (both against SP and NSP)

6) Infection with FMDV can give rise to disease of variable severity and to FMDV transmission of FMDV. FMDV may persist in the pharynx and associated lymph nodes of ruminants for a variable but limited period of time beyond 28 days. Such animals have been termed carriers. However, The only persistently infected species from which transmission of FMDV has been proven is the African buffalo (Syncerus caffer).

Country or zone free from FMD where vaccination is not practised Article 8.8.2

Country or zone free from FMD where vaccination is not practised Article 8.8.2

Conditions to qualify for inclusion in the list of countries or zones free from FMD, where vaccination is **not practiced/practiced**:

1).....

2) ……

3) Surveillance implemented to detect clinical signs of FMD and demonstrate no evidence of

i. infection with FMDV in unvaccinated animals

ii. FMDV transmission in previously vaccinated animals when the FMD free country or zone where vaccination is practised is seeking to become one where vaccination is not practised

4) ……..

Methods of surveillance
Article 8.8.41

1) Clinical survelliance

2) Virological survelliance

3) Serological survelliance

Clinical Surveillance

Clinical surveillance requires the physical examination of susceptible animals.

Surveillance based on clinical inspection may provide a high level of confidence of detection of disease if a sufficient number of clinically susceptible animals is examined at an appropriate frequency and investigations are recorded and quantified.

Clinical examination and diagnostic testing should be applied to clarify the status of suspected cases. Diagnostic testing may confirm clinical suspicion, while clinical surveillance may contribute to confirmation of positive laboratory test results

Virological Surveillance

Establishment of the molecular (PCR, Real time PCR) antigenic (ELISA) and other biological characteristics (sequencing) of FMD, as well as its source, is mostly dependent upon clinical surveillance to provide samples.

FMDV isolates/clinical sample should be sent to an OIE Reference Laboratory

- ✓ characterise isolates for epidemiological studies
- ✓ Vaccine Matching to select appropriate vaccine

	VACCINE STRAIN			
Field isolate	O-3039	O/TUR/5/09	O/TAW/98	O Manisa
Strain 1	0,51	>0,84		0,14
Strain 2	>0,85	>0,86		0,16
Strain 3	0,41	0,45	0,21	0,14
Strain 4	>0,90	>1,0	0,34	0,50

MATCH ($r_1 \geq 0.3$),
NO MATCH ($r_1 < 0.3$),
Borderline result (0.28-0.32)

Serological Surveillance

Serological surveillance aims to detect antibodies resulting from infection or vaccination (SP and NSP)

Estimate the prevalence or substantiate freedom from Serological surveillance may be used to:

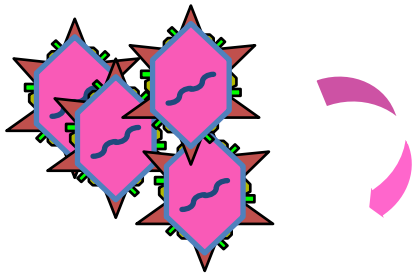
- ✓ estimate the prevalence or substantiate freedom from FMDV infection or transmission;
- ✓ monitor population immunity

Positive FMDV antibody test results can have two main possible causes:

– infection with FMDV;

– vaccination against FMD;

Humoral response in FMDV vaccinated animals



Antibodies elicited only against Structural Proteins

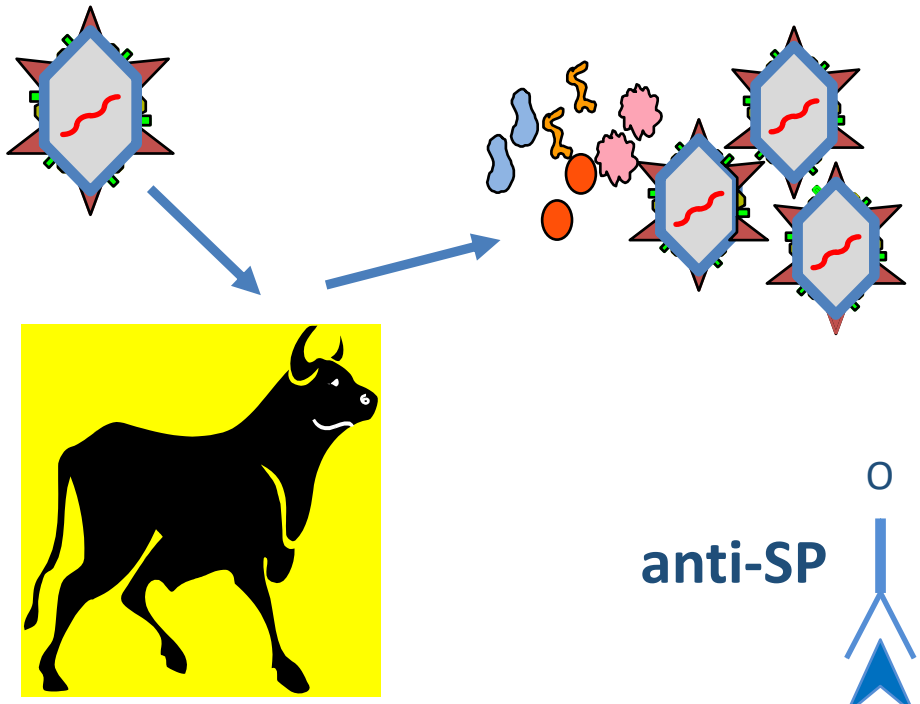
No replication of FMD virus

No production of NSP

Immune system exposed to Structural Proteins (SP)

Do not distinguish vaccinated for infected animals

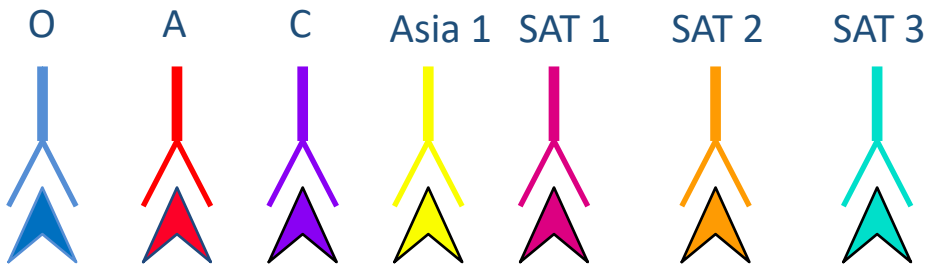
Humoral response in FMDV infected animals



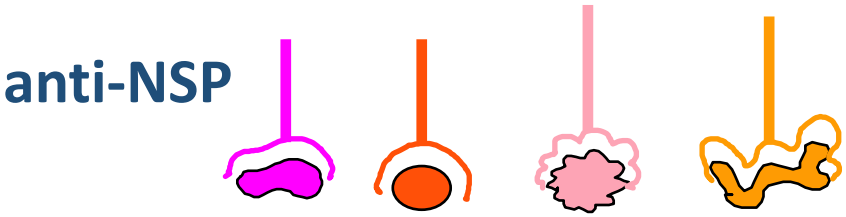
Virus production and excretion

↓

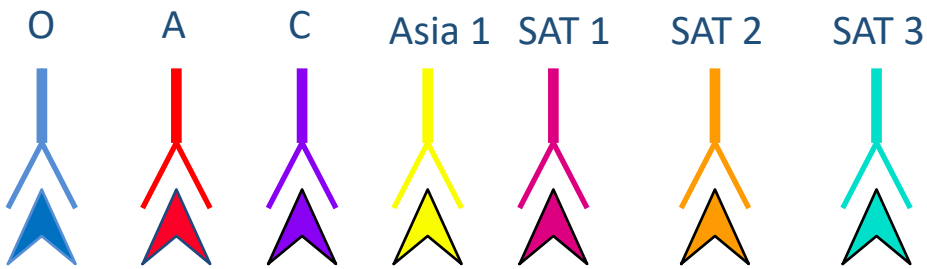
Antibodies elicited



FMD virus replication
Production of both
Structural Proteins (SP)
Non Structural Proteins (NSP)
DIVA test



FMDV serology



Tests for anti-SP Antibodies

<u>Seven different assays</u>, one for each FMD virus type

O / A / C / Asia 1 / SAT 1 / SAT 2 / SAT 3

Tests for anti-NSP Antibodies

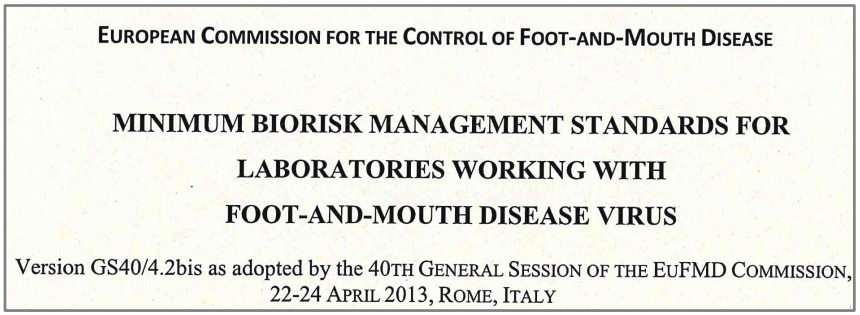
A <u>unique</u> assay for all FMD virus types

Available commercial test

Serological and virological FMD diagnosis

FMD laboratory diagnosis **carried out in the country**

- ✓ Equipped lab for virological and/ or serological diagnosis
- ✓ capability and tests used
- ✓ Procedure for quality assurance (ISO or GLP)
- ✓ Participation at ring test
- ✓ biosecurity and biosafety measures applied



EUROPEAN COMMISSION FOR THE CONTROL OF FOOT-AND-MOUTH DISEASE

MINIMUM BIORISK MANAGEMENT STANDARDS FOR LABORATORIES WORKING WITH FOOT-AND-MOUTH DISEASE VIRUS

Version GS40/4.2bis as adopted by the 40TH GENERAL SESSION OF THE EUFMD COMMISSION, 22-24 APRIL 2013, ROME, ITALY

FMD laboratory diagnosis **is not carried out in the country**

- ✓ Name of laboratory that providing the service

Ring Test organised by WRL

Laboratory capability:
minimum diagnostic capabilities for laboratories location in countries at different stage of the PCP (score using common panels of identical samples sent to all participating laboratories – irrespective of their status)

Capability Level	Relevant for FMD status	VIROLOGY (Panel 1)		SEROLOGY (Panel 2)	
		Minimum test requirements	Expected lab capability	Minimum test requirements	Expected lab capability
0	PCP 0	n/a	n/a	NSP ELISA	Define infection history (FMDV+/-)
1	PCP 1	either AgELISA or RT-PCR	• FMD virus present • FMDV serotype	NSP ELISA	Define infection history (FMDV+/-)
2	PCP 2	either AgELISA or RT-PCR	• FMD virus present • FMDV serotype	NSP ELISA SP ELISA	• Define infectious status • vaccination status • serotype • +/- PVM
3	PCP 3	AgELISA rRT-PCR +/- sequencing +/- VI*	• FMD virus present • FMDV serotype, topotype, lineage	NSP ELISA SP ELISA +/- VNT	• Define infectious status • vaccination status • serotype • +/- PVM
4	PCP 4	AgELISA rRT-PCR sequencing +/- VI	• FMD virus present • FMDV serotype topotype, lineage	NSP ELISA SP ELISA VNT	• Define infectious status • vaccination status • serotype • PVM
5	OIE/FAO Reference Laboratories (PCP 5)	Enhanced genome sequencing	• FMD virus present • FMDV serotype • topotype, lineage, and relationship between FMDV positive samples in panel	NSP ELISA SP ELISA VNT	• Define infectious status • vaccination status • serotype • PVM • identify cross-reactivity

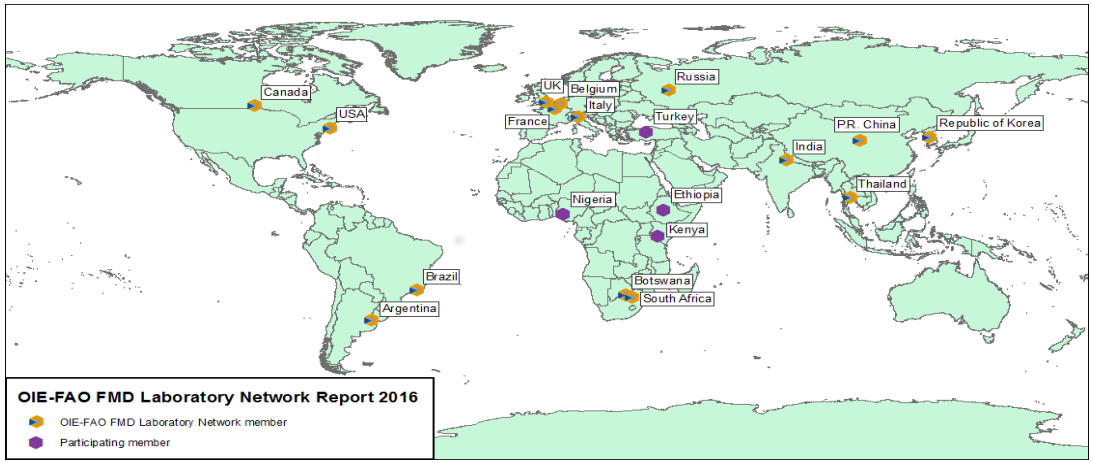
* If able to receive the infectious panel

THE Pirbright INSTITUTE

OIE/FAO FMD Laboratory Network

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
- Review of FMD risks
- Test improvement and harmonization

THANKS

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