

# WOAH Reference Laboratory Reports Activities 2022

## Activities in 2022

This report has been submitted : 25 avril 2023 15:57

### Laboratory Information

<b>Name of disease (or topic) for which you are a designated WOA Reference Laboratory:</b>	Foot and mouth disease
<b>Address of laboratory:</b>	Via Bianchi
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<b>E-mail address:</b>	santina.grazioli@izsler.it
<b>Website:</b>	www.izsler.it
<b>Name (including Title) of Head of Laboratory (Responsible Official):</b>	Dr. Piero Frazzi General Director
<b>Name (including Title and Position) of WOA Reference Expert:</b>	Dr. Santina Grazioli Head of National/WOAH Reference Centre for FMD and SVD, Head of Biotechnology Lab
<b>Which of the following defines your laboratory? Check all that apply:</b>	Governmental

### TOR1: DIAGNOSTIC METHODS

1. Did your laboratory perform diagnostic tests for the specified disease/topic for purposes such as disease diagnosis, screening of animals for export, surveillance, etc.? (Not for quality control, proficiency testing or staff training)

Yes

Diagnostic Test	Indicated in WOA Manual (Yes/No)	Total number of test performed last year	
		Nationally	Internationally
Indirect diagnostic tests			
Competitive ELISA – Ab to SP type O	yes	104	0
Competitive ELISA – Ab to SP type A	yes	104	0
Competitive ELISA – Ab to SP type Asia 1	yes	104	0

Competitive ELISA – Ab to SP type SAT 2	yes	104	0
Direct diagnostic tests		Nationally	Internationally

## TOR2: REFERENCE MATERIAL

2. Did your laboratory produce or supply imported standard reference reagents officially recognised by WOA?H?

No

3. Did your laboratory supply standard reference reagents (nonWOAH-approved) and/or other diagnostic reagents to WOA?H Members?

Yes

TYPE OF REAGENT AVAILABLE	RELATED DIAGNOSTIC TEST	PRODUCED/ PROVIDE	AMOUNT SUPPLIED NATIONALLY (ML, MG)	AMOUNT SUPPLIED INTERNATIONALLY (ML, MG)	NO. OF RECIPIENT WOA?H MEMBER COUNTRIES	COUNTRY OF RECIPIENTS
Ready-to-use kit: FMDV Antigen Detection ELISA and serotyping (O, A, Asia1, C, SAT1-2) (1 kit= 5 plates)	Ag detection and serotyping ELISA	Produced and provided	0	N. 144 kits	36	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for FMDV NSP antibodies (1 kit=5 plates)	FMDV NSP Ab ELISA (3ABC trapping ELISA)	Produced and provided	0	N. 99 kits	15	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for FMDV SP-Ab Type O (1 kit=5 plates)	Solid-phase competitive ELISA (SP-Ab type O)	Produced and provided	0	N. 476 kits	35	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for FMDV SP-Ab Type A (1 kit=5 plates)	Solid-phase competitive ELISA (SP-Ab type A)	Produced and provided	0	N. 177 kits	30	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for FMDV SP-Ab Type Asia1 (1 kit=5 plates)	Solid-phase competitive ELISA (SP-Ab type Asia1)	Produced and provided	0	N. 61 kits	23	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for SP-Ab Type SAT2 (1 kit=5 plates)	Solid-phase competitive ELISA (SP Ab type SAT2)	Produced and provided	0	N. 43 kits	21	Africa Asia and Pacific Europe MiddleEast
Ready-to-use ELISA kit for SP-Ab Type SAT1 (1 kit=5 plates)	Solid-phase competitive ELISA (SP Ab type SAT1)	Produced and provided	0	N. 29 kits	12	Africa Asia and Pacific Europe MiddleEast
Ready-to-use Master Mix for	rtRT-PCR 3D region	Assembled and provided	0	N. 20 tubes, each tube contains 50	10	Europe

FMDV rtRT-PCR				reactions		
Positive control for molecular tests consisting of inactivated FMD virus	BEI inactivated FMD virus	Produced and provided	0	N. 10 tubes, each tube contains 1 ml	10	Europe
multiplex Lateral Flow Device (LFD) for detection and typing of FMDV (including extraction kits)	multiplex Lateral Flow Device (LFD)	provided	0	N. 60 multiplex LFD	1	Africa
N. 2 different monoclonal antibodies specific for different FMDV serotypes	Varius test, research programm	Produced and provided	0	n. 2 tubes 1 ml each	2	Europe

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to WOAHA Members?

No

### **TOR3: NEW PROCEDURES**

6. Did your laboratory develop new diagnostic methods for the designated pathogen or disease?

Yes

NAME OF THE NEW TEST OR DIAGNOSTIC METHOD DEVELOPED	DESCRIPTION AND REFERENCES (PUBLICATION, WEBSITE, ETC.)
multiplex Lateral Flow Device (LFD) for detection and typing of FMDV	2. Simone Cavallera, Alida Russo, Barbara Colitti, Sergio Rosati, Chiara Nogarol, Efrem Alessandro Foglia, Santina Grazioli, Giulia Pezzoni, Fabio Di Nardo, Thea Serra, Matteo Chiarella, Claudio Baggiani, Emiliana Brocchi and Laura Anfossi Design of multiplexing lateral flow immunoassay for detection and typing of foot-and-mouth disease virus using pan-reactive and serotype-specific monoclonal antibodies: evidence of a new hook effect <i>Talanta</i> . 2022 Apr 1;240:123155. doi: 10.1016/j.talanta.2021.123155. 6. EA Foglia, V Mioulet, S İnel Turgut, A Sangula, L Anfossi, C Nogarol, C Cavallera, L Henry, G Pezzoni, S Rosati, A Bulut, D King, E Brocchi, S Grazioli Preliminary validation of multiplex Eurasia lateral flow device for on-field identification and serotyping of Foot-And-Mouth Disease Viruses serotype O, A and Asia1 OS22 – EuFMD OPEN SESSION Special Edition; 26,27, 28 Ottobre 2022, Hybrid event/Marsiglia

7. Did your laboratory validate diagnostic methods according to WOAHA Standards for the designated pathogen or disease?

No

8. Did your laboratory develop new vaccines for the designated pathogen or disease?

No

9. Did your laboratory validate vaccines according to WOAHA Standards for the designated pathogen or disease?

No

**TOR4: DIAGNOSTIC TESTING FACILITIES**

10. Did your laboratory carry out diagnostic testing for other WOAHA Members?

No

11. Did your laboratory provide expert advice in technical consultancies on the request of an WOAHA Member?

No

**TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES**

12. Did your laboratory participate in international scientific studies in collaboration with WOAHA Members other than the own?

Yes

Title of the study	Duration	PURPOSE OF THE STUDY	PARTNERS (INSTITUTIONS)	WOAHA MEMBER COUNTRIES INVOLVED OTHER THAN YOUR COUNTRY
Validation of Lateral Flow Devices (LFD) for detection and serotyping of Foot and Mouth Disease Virus (FMDV) and antigenic detection of Lumpy Skin Disease Virus (LSDV).	1 year	The main expected outcome of the study is the evaluation of the analytical and diagnostic performances of the developed tests: • FMDV LFD1 for detection and serotyping of FMDV O, A, Asia 1 and Pan FMD • FMDV LFD2 for detection and serotyping of FMDV SAT 1, SAT2 and Pan FMD • LSD LFD for detection of LSD and eventually other Capripoxviruses	Department of Veterinary Sciences and Chemistry of the University of Turin (Prof. S. Rosati and Prof. L. Anfossi) In3Diagnostic – Turin Italy (Dr Chaira Nogarol) Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (IZSAM) – Italian national Reference Center for exotic diseases (Dr Federica Monaco) The Pirbright Institute (TPI) – World Reference Laboratory WRLFMD (Dr Donald King) Friedrich-Loeffler-Institut (FLI) (Dr Bernd Hoffman)	GERMANY UNITED KINGDOM
Research agreement between IZSLER and the Pirbright Institute	5 years	Research and development of assay for FMDV diagnosis	The Pirbright Institute	UNITED KINGDOM

**TOR6: EPIZOOLOGICAL DATA**

14. Did your Laboratory collect epidemiological data relevant to international disease control?

No

15. Did your laboratory disseminate epidemiological data that had been processed and analysed?

No

16. What method of dissemination of information is most often used by your laboratory? (Indicate in the appropriate box the number by

category and list the details in the box)

a) Articles published in peer-reviewed journals:

7

1. Andrew E Shaw, Alison Burman, Amin Asfor, Emiliana Brocchi, Santina Grazioli, Clare Browning, Anna Ludi, Tobias J Tuthill, Donald P King  
*Avidity of polyclonal antibodies to foot-and-mouth disease virus in bovine serum measured using Bio-Layer interferometry.*  
*Viruses.* 2022 Mar 29;14(4):714. doi: 10.3390/v14040714.
2. Simone Cavallera, Alida Russo, Barbara Colitti, Sergio Rosati, Chiara Nogarol, Efreem Alessandro Foglia, Santina Grazioli, Giulia Pezzoni, Fabio Di Nardo, Thea Serra, Matteo Chiarella, Claudio Baggiani, Emiliana Brocchi and Laura Anfossi  
*Design of multiplexing lateral flow immunoassay for detection and typing of foot-and-mouth disease virus using pan-reactive and serotype-specific monoclonal antibodies: evidence of a new hook effect*  
*Talanta.* 2022 Apr 1;240:123155. doi: 10.1016/j.talanta.2021.123155.
3. Pezzoni G, Calzolari M, Foglia EA, Bregoli A, Nardo AD, Sghaier S, Madani H, Chiapponi C, Grazioli S, Relmy A, Bakkali Kassimi L, Brocchi E  
*Characterization of the O/ME-SA/Ind-2001d foot-and-mouth disease virus epidemic recorded in the Maghreb during 2014-2015.*  
*Transbound Emerg Dis.* 2022 Jun 10. doi: 10.1111/tbed.14611.
4. Anna B. Ludi, Alison Morris, Simon Gubbins, Amin Asfor, Madeeha Afzal, Clare F. Browning, Santina Grazioli, Efreem Alessandro Foglia, Ginette Wilsden, Alison Burman, Emiliana Brocchi, David J. Paton \*, Donald P. King  
*Cross-serotype reactivity of ELISAs used to detect antibodies to the structural proteins of foot-and-mouth disease virus*  
*Viruses.* 2022 Jul 8;14(7):1495. doi: 10.3390/v14071495.PMID: 35891476
5. Canini L, Blaise-Boisseau S, Nardo AD, Shaw AE, Romey A, Relmy A, Bernelin-Cottet C, Salomez AL, Haegeman A, Ularanu H, Madani H, Ouoba BL, Zerbo HL, Souare ML, Boke CY, Eldaghayes I, Dayhum A, Ebou MH, Abouchoaib N, Sghaier S, Lefebvre D, DeClercq K, Milouet V, Brocchi E, Pezzoni G, Nfon C, King D, Durand B, Knowles N, Kassimi LB, Benfrid  
*Identification of diffusion routes of O/EA-3 toptotype of foot-and-mouth disease virus in Africa and Western Asia between 1974 and 2019 - a phylogeographic analysis.*  
*Transbound Emerg Dis.* 2022 Sep;69(5):e2230-e2239. doi: 10.1111/tbed.14562. Epub 2022 Jun 3.PMID: 35435315.
6. Artur Summerfield, Heidi Gerber, Rebeka Schmitt, Matthias Liniger, Santina Grazioli, Emiliana Brocchi  
*Relationship between neutralizing and opsonizing monoclonal antibodies against foot-and-mouth disease virus*  
*Front Vet Sci.* 2022 Oct 12;9:1033276. doi: 10.3389/fvets.2022.1033276. eCollection 2022.
7. Fadila Abosrer, Giulia Pezzoni, Emiliana Brocchi, Anna Castelli, Stefano Baselli, Santina Grazioli, Hafsa Madani, Eلفurgani Kraim, Abdunaser Dayhum, Ibrahim Eldaghayes  
*FTA Cards as a Rapid Tool for Collection and Transport of Infective Samples: Experience with Foot-and-Mouth Disease Virus in Libya*  
*Animals (Basel).* 2022 Nov 18;12(22):3198. doi: 10.3390/ani12223198.

b) International conferences:

5

1. Foglia Efreem Alessandro, Baselli Stefano, Brocchi Emiliana, Grazioli Santina, Pezzoni Giulia.  
*Analysis of in vitro simultaneous replication of two serotypes of Foot-and-Mouth Disease Virus*  
*Europic 2022: European Study Group on the Molecular Biology of Picornaviruses 05/09 June 2022*
2. Giulia Pezzoni, Efreem Foglia, Giampietro Maccabiani, Tiziana Trogu, Giuseppe Meriardi, Santina Grazioli. *Ongoing activities on Fmd and other TADS at IZSLER: National/FAO/WOAH FMD Reference Laboratory. (Poster)*  
*WOAH-30th Conference of the Regional Commission for Europe, Catania, Italy 3/7 October 2022*
3. EA Foglia, G Pezzoni, G Maccabiani, M Corsa, S Baselli, T Trogu, S Grazioli  
*Correlation between virus neutralization test and Solid Phase Competitive ELISA on vaccinated animals. the impact of homology among Foot-And-Mouth Disease Virus strains behind vaccines and tests*  
*OS22 – EuFMD OPEN SESSION Special Edition; 26,27, 28 Ottobre 2022, Hybrid event/Marsiglia*
4. EA Foglia, V Mioulet, S Inel Turgut, A Sangula, L Anfossi, C Nogarol, C Cavallera, L Henry, G Pezzoni, S Rosati, A Bulut, D King, E Brocchi, S Grazioli  
*Preliminary validation of multiplex Eurasia lateral flow device for on-field identification and serotyping of Foot-And-Mouth Disease*

*Viruses serotype O, A and Asia 1**OS22 – EuFMD OPEN SESSION Special Edition; 26,27, 28 Ottobre 2022, Hybrid event/Marsiglia**5. Abdelaziz A. Yassin, Alison Burman, Santina Grazioli, Madeeha Afzal, David Paton, E Brocchi, Daniel Horton, Donald P. King, Amin S. Asfor**Identification of a cross-reactive epitope within the G-H loop of FMDV**OS22 – EuFMD OPEN SESSION Special Edition; 26,27, 28 Ottobre 2022, Hybrid event/Marsiglia*

## c) National conferences:

1

*National Congress organised by SIMeVep – Italian Society of Veterinary Medicine**Date and location: 20 May 2022. Rome**Work presented: Epidemic emergencies for veterinary services and socio-economic impact (Grazioli). Participation of the Head of NRL at the round table.*

## d) Other (Provide website address or link to appropriate information):

**TOR7: SCIENTIFIC AND TECHNICAL TRAINING**

17. Did your laboratory provide scientific and technical training to laboratory personnel from other WOAHA Members?

Yes

a) Technical visit :

b) Seminars : 2

c) Hands-on training courses:

d) Internships (&gt;1 month)

Type of technical training provided (a, b, c or d)	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
On line training addressed to vet colleagues from Northwest Syria focused on Foot and mouth disease diagnostic methods	Syria	2
Online training organized for the Indonesian distributor of IZSLER ELISA kits	Indonesia	4

**TOR8: QUALITY ASSURANCE**

18. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)	
ISO 17025	CERTIFICATO-DI-ACCREDITAMENTO.pdf	Accreditation Certificate.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Competitive ELISA – SP antibodies (FMDV serotype O, A, C, Asia1, SAT1, SAT2)	Accredia: Italy System Accreditation Service
VNT for SP-Ab detection against each of the 7 FMDV serotypes	Accredia: Italy System Accreditation Service
NSP Ab ELISA (3ABC trapping ELISA)	Accredia: Italy System Accreditation Service
FMDV Antigen detection and serotyping ELISA	Accredia: Italy System Accreditation Service
Realtime RT-PCR (3D and 5'UTR regions)	Accredia: Italy System Accreditation Service
Other assays (Virus Isolation, VP1 sequencing, Topotypesspecific realtime RT-PCR) are IZSLER-coded tests	Accredia: Italy System Accreditation Service

20. Does your laboratory maintain a "biorisk management system" for the pathogen and the disease concerned?

Yes

The Biorisk management system maintained in the lab is according the requirements of "Minimum Biorisk Management standards for foot and mouth disease laboratories (MBRMS)"

## TOR9: SCIENTIFIC MEETINGS

21. Did your laboratory organise scientific meetings related to the pathogen in question on behalf of WOAHP?

No

22. Did your laboratory participate in scientific meetings related to the pathogen in question on behalf of WOAHP?

Yes

Title of event	Date (mm/yy)	Location	Role (speaker, presenting poster, short communications)	Title of the work presented
17th WOAHP/FAO FMD Laboratory Network Meeting	2022-11-29	Lelystad, The Netherlands	Participant as Lab expert	Updates from the WOAHP/FAO reference lab- IZSLER

## TOR10: NETWORK WITH WOAHP REFERENCE LABORATORIES

23. Did your laboratory exchange information with other WOAHP Reference Laboratories designated for the same pathogen or disease?

Yes

24. Are you a member of a network of WOAHP Reference Laboratories designated for the same pathogen?

Yes

PURPOSE OF THE PROFICIENCY TESTS: 1	ROLE OF YOUR REFERENCE LABORATORY (ORGANISER/ PARTICIPANT)	NO. PARTICIPANTS	PARTICIPATING WOAHP REF. LABS/ ORGANISING WOAHP REF. LAB.
1. FMD/SVD Proficiency Test 2022, organized by the FMD-EURL, ANSES, France. It aimed to evaluate testing laboratory capability for early detect FMD/SVD outbreaks using virological and serological methods. Panels 1-live viruses (four samples) for FMDV/SVD			FMD National Reference

<p>detection, typing and sequencing (tests applied: VI, Ag detection and serotyping ELISA, rtRT-PCR, VP1 sequencing with phylogenetic analysis); Panel 3 (5 samples) for FMDV serological tests (tests applied: NSP-Ab ELISA, SP-Ab ELISA, VNT); Panel 4 (four samples) for SVD serological tests (tests applied: 5B7 competitive ELISA, SVDV isotype-specific ELISA for IgG and IgM, VNT).</p>	<p>participant</p>	<p>30</p>	<p>Laboratories of EU member countries and laboratories from others European countries. Organizing Lab: EURL (ANSES/France)</p>
<p>FMD/SVD Proficiency Test 2022 (PHASE XXXIV: 2022), organized by the FMD-WRL, with the request to employ the test systems in use in each lab to address the scenarios that accompany the samples. Panels 1-live viruses for FMDV detection, typing and sequencing, with interpretation of the FMDV status for the individual samples and cases outlined in the scenario; Panel 2 for FMDV serological investigation with interpretation of the FMDV status and post-vaccination immunity.</p>	<p>participant</p>	<p>40</p>	<p>WOAH/FAO Reference Laboratories for FMD and NRL of other OIE Member countries Organizing Lab: FMDWRL/The Pirbright Institute, UK</p>

25. Did you organise or participate in inter-laboratory proficiency tests with WOA Reference Laboratories designated for the same pathogen?

Yes

PURPOSE OF THE PROFICIENCY TESTS: 1	ROLE OF YOUR REFERENCE LABORATORY (ORGANISER/ PARTICIPANT)	NO. PARTICIPANTS	PARTICIPATING WOAH REF. LABS/ ORGANISING WOAH REF. LAB.
<p>FMD/SVD Proficiency Test 2022, organized by the FMD-EURL, ANSES, France. It aimed to evaluate testing laboratory capability for early detect FMD/SVD outbreaks using virological and serological methods. Panels 1-live viruses (four samples) for FMDV/SVD detection, typing and sequencing (tests applied: VI, Ag detection and serotyping ELISA, rtRT-PCR, VP1 sequencing with phylogenetic analysis); Panel 3 (5 samples) for FMDV serological</p>	<p>participant</p>	<p>30</p>	<p>FMD National Reference Laboratories of EU member countries and laboratories from others European countries. Organizing Lab: EURL (ANSES/France)</p>



tests (tests applied: NSP-Ab ELISA, SP-Ab ELISA, VNT); Panel 4 (four samples) for SVD serological tests (tests applied: 5B7 competitive ELISA, SVDV isotype-specific ELISA for IgG and IgM, VNT).			
FMD Proficiency Test 2022 (PHASE XXXIV: 2022), organized by the FMD-WRL, with the request to employ the test systems in use in each lab to address the scenarios that accompany the samples. Panels 1-live viruses for FMDV detection, typing and sequencing, with interpretation of the FMDV status for the individual samples and cases outlined in the scenario; Panel 2 for FMDV serological investigation with interpretation of the FMDV status and post-vaccination immunity.	participant	40	OIE/FAO Reference Laboratories for FMD and NRL of other WOAHP Member countries Organizing Lab: FMDWRL/The Pirbright Institute, UK

26. Did your laboratory collaborate with other WOAHP Reference Laboratories for the same disease on scientific research projects for the diagnosis or control of the pathogen of interest?

Yes

TITLE OF THE PROJECT OR CONTRACT	SCOPE	NAME(S) OF RELEVANT WOAHP REFERENCE LABORATORIES
Research agreement to development of new and improved diagnostic ELISAs and reagents	Six different projects finalized to improve and apply new technology for FMD serology and antigen detection.	The Pirbright Institute, UK

## TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

27. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than WOAHP Reference Laboratories for the same pathogen?

Yes

Purpose for inter-laboratory test comparisons <sup>1</sup>	Role of your reference laboratory (organizer/participant)	No. participating laboratories	Region(s) of participating WOAHP Member Countries
Participation at the FMD/SVD Proficiency Test 2022 organized by EURL for NRLs	participant	30	Europe
Organization of a national Proficiency Test for FMD, to build and maintain preparedness of regional laboratories to support the NRL in case of	organiser	10	Europe

emergency. The 2021 national PT included serological against the FMDV type O.

Participation at the FMD Proficiency Test 2022 organized by WRL

participant

40

Africa  
America  
Asia and Pacific  
Europe  
MiddleEast

## TOR12: EXPERT CONSULTANTS

28. Did your laboratory place expert consultants at the disposal of WOA?H?

Yes

KIND OF CONSULTANCY	Location	SUBJECT (FACULTATIVE)
Member of the Scientific Commission for Animal Diseases (SCAD)	Paris, OIE	Assistance in identifying the most appropriate strategies and measures for disease prevention and control. Evaluation of Member Country submissions regarding their animal health status
Continuous remote assistance and advice is regularly provided to various Member countries for elaboration and interpretation of results recorded with the diagnostic kits supplied for FMD diagnosis and serology		

29. Additional comments regarding your report: