WOAH Reference Laboratory Reports Activities 2022

Activities in 2022

This report has been submitted : 25 avril 2023 17:16

Laboratory Information

Name of disease (or topic) for which you are a designated WOAH Reference Laboratory:	Fièvre aphteuse
Address of laboratory:	14 rue Pierre et Marie Curie 94700 Maisons-Alfort France
Tel.:	+33149771300
E-mail address:	labib.bakkali-kassimi@anses.fr
Website:	www.anses.fr
Name (including Title) of Head of Laboratory (Responsible Official):	Dr Pascal BOIREAU Directeur du Laboratoire de Santé Animale
Name (including Title and Position) of WOAH Reference Expert:	Dr Labib BAKKALI KASSIMI, Chef d'Unité de virologie Adjoint
Which of the following defines your laboratory? Check all that apply:	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 WOAH Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
NSP ELISA	Yes	247	212
VNT	Yes	3	0
SP ELISA	Yes	242	0
Direct diagnostic tests		Nationally	Internationally
rtRT-PCR FMDV detection	Yes	235	487
rtRT-PCR FMDV typing	No	0	25

Ag ELISA	Yes	0	103
Virus isolation	Yes	0	202
Sequencing	Yes	0	100

TOR2: REFERENCE MATERIAL

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

No

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

No

4. Did your laboratory produce vaccines?

Not applicable

5. Did your laboratory supply vaccines to WOAH Members?

Not applicable

TOR3: NEW PROCEDURES

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

No

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

No

TOR4: DIAGNOSTIC TESTING FACILITIES

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

Yes

NAME OF WOAH MEMBER COUNTRY SEEKING ASSISTANCE	DATE	WHICH DIAGNOSTIC TEST USED	NO. SAMPLES RECEIVED FOR PROVISION OF DIAGNOSTIC SUPPORT	NO. SAMPLES RECEIVED FOR PROVISION OF CONFIRMATORY DIAGNOSES
TUNISIA	2022-01-21	rtRT-PCR; VI; Ag ELISA; Sequencing		15
OMAN	2022-02-01	rtRT-PCR; VI; Ag ELISA; Sequencing; SNP ELISA	439	
MALI	2022-03-01	rtRT-PCR; VI; Ag ELISA; Sequencing	10	
NIGER	2022-06-01	rtRT-PCR; VI; Ag ELISA; Sequencing; NSP ELISA	125	

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

Yes

NAME OF THE WOAH MEMBER COUNTRY RECEIVING A TECHNICAL CONSULTANCY	PURPOSE	HOW THE ADVICE WAS PROVIDED
TUNISIA	Diagnosis and Vaccine	Email

TOR5: COLLABORATIVE SCIENTIFIC AND TECHNICAL STUDIES

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

Yes

Title of the study	Duration	PURPOSE OF THE STUDY	PARTNERS (INSTITUTIONS)	WOAH MEMBER COUNTRIES INVOLVED OTHER THAN YOUR COUNTRY
Improved control of priority animal diseases: Novel vaccines and companion diagnostic tests for African horse sickness, peste des petits ruminants and foot-and-mouth disease	2022-2025	Develop innovative vaccines and companion diagnostic tests for three priority animal diseases	Friedrich-Loeffler-Institut (FLI); Centre de coopération International en Recherche Agronomique pour le Developpement (CIRAD); Center for cooperative research in biosciences (CICbioGUNE); Innovative Diagnostic (IDvet); Boehringer Ingelheim International (BI; University of Nottingham (UNOTT); Consejo Superior de Investigaciones Cientificas (CSIC), CISA-INIA; Wageningen Bioveterinary Research (WBVR); University of Pretoria (UP); University of Surrey (UoS); Institut Sénégalais de Recherches Agricoles (ISRA); Central Veterinary Laboratory (LCV); French Agency for Food, Environmental and Occupational Health & Safety (ANSES)	GERMANY SENEGAL SOUTH AFRICA SPAIN THE NETHERLANDS UNITED KINGDOM
From proteogenomic host response signatures of persistent foot-and-mouth disease virus (FMDV) infection to	2021-2024	To determine the molecular mechanisms involved in the establishment and maintenance of FMD virus persistence in ruminants in order to improve the diagnosis of	Swedish University of Agricultural Sciences (SLU); Friedrich-Loeffler-Institut (FLI); Sciensano; SAP institute; French Agency for Food,	BELGIUM GERMANY SWEDEN TURKEY

diagnostic markers and therapeutic control		asymptomatic carrier animals and to develop therapeutic tools to prevent this persistence or to stop the infection	Environmental and Occupational Health & Safety (ANSES)	
Preparedness and Response in an Emergency context to Pathogens of MEDical and VETerinary importance	2020-2023	To provide a universal, fast and mobile pathogen identification tool together with rapid large-scale production and validation of adapted diagnostic capacity that are both easy-to-use and therefore accessible also for end users	Friedrich-Loeffler-Institut, Federal Research Institut for Animal Health (FLI); Bernhard Nocht Institut for Tropical Medicine (BNITM); French Agency for Food, Environmental and Occupational Health & Safety (ANSES); Aix-Marseille University (AMU)	GERMANY

TOR6: EPIZOOLOGICAL DATA

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

Yes

IF THE ANSWER IS YES, PLEASE PROVIDE DETAILS OF THE DATA COLLECTED:
Characterisation of FMDV circulating in Sultanate Oman between 2018 and 2022 First detection of FMDV A/Africa/G-I in Sultanate Oman Identification of the new FMDV O/ME-SA/SA-2018 lineage in Sultanate Oman New introduction of FMDV O/EA-3 in Tunisia

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

Yes

IF THE ANSWER IS YES, PLEASE PROVIDE DETAILS OF THE DATA COLLECTED:
We seek to understand the FMDV phylodynamics of O/EA-3 stain at the inter-regional scale. We analyzed a total of 545 samples collected from 25 African and middle-eastern countries between 1974 and 2019. Using Bayesian evolutionary models, we inferred the relationships between the analyzed FMDV strains and their associated transboundary movements across the continent. This reconstruction highlights again the role of East Africa as a major source for inter-continental spread of FMDV as two variants of the same viral topotype followed independent spreading pathways, one to North-East Africa, the other one to Central, West and North-West Africa. We described that the possible migration routes from Central Africa to West Africa or Maghreb for the spread of the O/EA-3 topotype are more intricate than expected. This study highlights the need for thorough surveillance of the disease through epidemiological monitoring and vaccination at an inter-regional scale in Africa to prevent the transboundary movements of FMDV

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:

5

Canini L, Blaise-Boisseau S, Wadsworth J, Nardo AD, Shaw A, Romey A, Relmy A, Bernelin-Cottet C, Salomez AL, Haegeman A, Ularamu H, Lefebvre D, De Clercq K, Mioulet V, Brocchi E, Pezzoni G, Nfon C, King D, Durand B, Knowles N, Kassimi LB, Benfrid S. Identification of diffusion routes of O/EA-3 topotype of foot-and-mouth disease virus in Africa and Western Asia between 1974 and 2019 - a phylogeographic analysis. Transbound Emerg Dis. 2022 Apr 18. doi: 10.1111/tbed.14562. Online ahead of print. PMID: 35435315

Pezzoni G, Calzolari M, Foglia EA, Bregoli A, Nardo AD, Sghaier S, Madani H, Chiapponi C, Grazioli S, Relmy A, Kassimi LB, Brocchi E. Characterization of the O/ME-SA/Ind-2001d foot-and-mouth disease virus epidemic recorded in the Maghreb during 2014-15. Transbound Emerg Dis. 2022 Jun 10. doi: 10.1111/tbed.14611. Epub ahead of print. PMID: 35686649

Sarry, M.; Vitour, D.; Zientara, S.; Bakkali Kassimi, L.; Blaise-Boisseau, S. Foot-and-Mouth Disease Virus: Molecular Interplays with IFN Response and the Importance of the Model. Viruses 2022, 14, 2129. https://doi.org/10.3390/v14102129

Dickmu, S. , Awah-Ndukum, J. , Aziwo, N. , Sevidzem, S. , Mouliom Mouiche, M. , Rueda, C. , Kassimi, L. , Wade, A. , Garabed, R. , El-Yuguda, A. , Rodriguez, L. and Baba, S. (2022) Molecular and Serological Epidemiology of Foot-and-Mouth Disease Virus in North Region of Cameroon. Advances in Microbiology, 12, 579-595. doi: 10.4236/aim.2022.1210040

Sarry M, Romey A, Lefebvre D, Benfrid S, Dufour B, Durand B, Zanella G, De Regge N, Zientara S, Bakkali Kassimi L, Blaise-Boisseau S. Virologie. 2022 Sep 1;26(5):355-373. doi: 10.1684/vir.2022.0972

b) International conferences:

11

Canini L., Blaise-Boisseau S., Wadsworth J., Di Nardo A., Shaw A.E., Romey A., Relmy A., Bernelin-Cottet C., Salomez A.L., Haegeman A., Ularamu H., Lefebvre D., De Clercq K., Mioulet V., Brocchi E., Pezzoni G., Nfon C., King D.P., Durand B., Knowles N.J., Bakkali Kassimi L. & Benfrid S."Identification phylogéographique des routes de diffusion du virus de la fièvre aphteuse de topotype O/EA-3 en Afrique et en Asie Orientale de 1974 à 2019." XXIVemes Journées Francophones de Virologie, 11 et 12 avril 2022, Strasbourg,

Anne-Laure Salomez, Aurore Romey, Anthony Relmy, Cindy Bernelin-Cottet, Souheyla Benfrid, Morgan Sarry, Caroline Michaud, Mathilde Gondard, Stephan Zientara, Sandra Blaise-Boisseau et Labib Bakkali Kassimi. "Validation de la désinfection par procédés dirigés et non dirigés en laboratoire NSB3 du virus de la Fièvre aphteuse". XXIVemes Journées Francophones de Virologie, 11 et 12 avril 2022, Strasbourg.

Morgan Sarry, Souheyla Benfrid, Cindy Bernelin-Cottet, Anthony Relmy, Aurore Romey, Anne-Laure Salomez, Caignard Gregory, Stephan Zientara, Damien Vitour, Labib Bakkali Kassimi et Sandra Blaise-Boisseau "Interaction de la polymérase 3D du virus de la fièvre aphteuse avec la réponse interféron de type I (IFN I) : un lien avec la persistance virale?". CIFMIA (visio). Colloque International Francophone en Maladies Infectieuses Animales (CIFMIA), Montreal (Visio), 6 et 13 mai 2022.

Aurore Romey, Anthony Relmy, Cindy Bernelin-Cottet, Anne-Laure Salomez, Hatem Ouled Ahmed, Aymen Ben Salah, Labib Bakkali Kassimi."Nouvelle émergence du topotype O/EA-3 du virus de la fièvre aphteuse en Tunisie en 2022" Sonia Ben Hassen, Soufien Sghaier, Colloque International Francophone en Maladies Infectieuses Animales (CIFMIA), Montreal (Visio), 6 et 13 mai 2022.

Antonello Di Nardo, Jemma Wadsworth, Kasia Bachanek-Bankowska, Souheyla Benfrid, Sandra Blaise-Boisseau, Sabine Delannoy, Lidia Lasecka-Dykes, Christopher J. Kasanga, Andrew E. Shaw, Valerie Mioulet, Aurore Romey, Anthony Relmy, Patrick Fach, Hussaini Ularamu, Labib Bakkali Kassimi, Donald P. King & Nick J. Knowles. « Complete Genome Analyses of Foot-and-Mouth Disease Viruses Belonging to Serotypes O, A and SAT 2 in East, West and North Africa". XX1th Europic meeting, 5-9 juin 2022, Harrogate, UK.

Morgan Sarry, Souheyla Benfrid, Cindy Bernelin-Cottet, Anthony Relmy, Aurore Romey, Anne-Laure Salomez, Gregory Caignard, Stephan Zientara, Damien Vitour, Labib Bakkali Kassimi, Sandra Blaise-Boisseau. "Interplay between Foot-and-Mouth Disease Virus 3D polymerase and the type I interferon response: a contribution to viral persistence?" 12ième congrès international de l' European Society of Veterinary Virology (ESVV), Gand (Belgique), 20-23 septembre 2022

Morgan Sarry, Souheyla Benfrid, Cindy Bernelin-Cottet, Anthony Relmy, Aurore Romey, Anne-Laure Salomez, Gregory Caignard, Stephan Zientara, Damien Vitour, Labib Bakkali Kassimi, Sandra Blaise-Boisseau. "Interplay between Foot-and-Mouth Disease Virus 3D polymerase and the type I interferon response: a contribution to viral persistence?" Open session EUFMD 2016 Marseille, France, 26-28 October 2022

Eve Laloy, Sara Hägglund, Gael Penverne , Hélène Huet , Katarina Näslund, Aurore Rome, Anthony Relmy, Cindy Bernelin-Cottet, Caroline Michaud, Anne-Laure Salomez, Souheyla Benfrid, Stephan Zientara, Labib Bakkali Kassimi, Jean-François Valarcher and Sandra Blaise-Boisseau. Effect of ruxolitinib on persistent foot-and–mouth disease virus infection in multilayered cells derived from bovine dorsal soft palate. Open session EUFMD 2016 Marseille, France, 26-28 October 2022

Romey A., Belsham G.J., Benfrid S, Bernelin-Cottet C., Bulut A.N., Eschbaumer M., Hamers C.,Hudelet P., Jamal S.M., Relmy A., Ularamu H.G., Wungak Y.S., Zientara S., Bakkali Kassimi L.and Blaise-Boisseau S. Field evaluation of a safe and cost-effective shipment of FMDV suspected samples to diagnostic laboratories using lateral flow devices. Open session EUFMD 2016 Marseille, France, 26-28 October 2022

Wafa Ahmed Al-Rawahi, Jemma Wadsworth , Hayley M. Hicks , Nick J. Knowles , Antonello Di Nardo , Donald P. King, Souheila Benfrid , Sandra Blaise-Boisseau,Mathilde Gondard , Caroline Michaud , Anthony Relmy, Aurore Romey , Anne-Laure Salomez, Morgan Sarry , Stephan Zientara , Senan Baqir , Elshafie Ibrahim Elshafie , Aliya Al-Ansari, Cindy Bernelin-Cottet and Labib Bakkali Kassimi. The First isolation, molecular detection and phylogenetic analysis of fmdv a/africa/g1 in the sultanate of Oman. Open session EUFMD 2016 Marseille, France, 26-28 October 2022
Anne-Laure Salomez, Aurore Romey, Cindy Bernelin-Cottet, Anthony Relmy, Souheila Benfrid, Morgan Sarry, Caroline Michaud, Mathilde Gondard, Stephan Zientara, Sandra Blaise-Boisseau and Labib Bakkali Kassimi. Validation of disinfection by directed and non-directed processes in the bsl3 laboratory handling live foot-and-mouth disease virus. Open session EUFMD 2016 Marseille, France, 26-28 October 2022

c) National conferences:

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Sonia Ben Hassen, Soufien Sghaier, Aurore Romey, Anthony Relmy, Cindy Bernelin-Cottet, Anne-Laure Salomez, Hatem Ouled Ahmed, Aymen Ben Salah, Labib Bakkali Kassimi. Nouvelle émergence du topotype O/EA-3 du virus de la fièvre aphteuse en Tunisie et en Algérie en 2022. Rencontres Nationales de Santé Publique Vétérinaire, Bourges, 14 octobre 2022
Gondard Mathilde, Benfrid Souheyla, Bread Emmanuel, Touzain Fabrice, Blanchard Yannick, Forimore Fabien, Delannoy Sabine, Fach Patrick, Sandra Blaise-Boisseau, Bakkali Kassimi Labib, Zientara Stéphan. Amélioration des capacités de surveillance en virologie: Séquençage de génomes viraux d'intérêt vétérinaire (ISDA Maisons-Alfort, 19 Octobre 2022
C. Michaud, S. Inel Turgut, P. Tuncer Göktuna, C. Cokçaliskan, A. Romey, S. Hägglund, J. F. Valarcher,B. Litz, F. Pfaff, M. Eschbaumer, S. Zientara, L. Bakkali Kassimi and S. Blaise Boisseau. Persistance du virus de la fièvre aphteuse: De la signature transcriptomique de la réponse de l'hôte aux marqueurs diagnostiques. Journée des doctorants et des post doctorants ENVA, 20 septembre 2022, Maisons-Alfort
Cindy Bernelin-Cottet, Souheyla Benfrid, Anthony Relmy, Aurore Romey, Anne-Laure Salomez, Morgan Sarry, Michel Laurentie, Aldo Dekker, Michael Eschbaumer, Kris De Clercq, David J. Lefebvvre, Räzvan Dezideriu Motiu, Giulia Pezzoni, Maria José Ruano Ramos, Adi Steinrig, Britta Wood, Stephan Zientara, Sandra Blaise-Boisseau and Labib Bakkali Kassimi. Une nouvelle RT-PCR en temps réel triplex en une étape pour la détection des virus de la fièvre aphteuse. Rencontres Nationales de Santé Publique Vétérinaire, Bourges, 14 octobre 2022.
Romey A., Ularamu H.G., Bulut A.N., Jamal S., Belsham G.J., Hamers C., Hudelet P., Relmy A.? Bernelin-Cottet C.? Benfrid S.? Zientara S., Bakkali Kassimi L., Blaise-Boisseau S. Du terrain au laboratoire de référence: Développement et évaluation d'un protocole pour l'envoi à faible coût et sans risque infectieux de prélèvements issus de cas suspects de fièvre aphteuse. Rencontres Nationales de Santé Publique Vétérinaire, Bourges, 14 octobre 2022.

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 WOAH Members?

Yes

a) Technical visit : 0

b) Seminars : 850

c) Hands-on training courses: 5

d) Internships (>1 month) 1

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
B	Algeria	207

B	Tunisia	162
B	North, West and Central Africa	481
C	Albania	1
C	Kosovo	1
C	Moldova	1
C	Montenegro	1
C	Slovenia	1
D	Sultanate Oman	1

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	pdf	
ISO 17025	pdf	Portée détaillée MA_230216.pdf

19. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
rtRT-PCR	COFRAC
ELISA	COFRAC

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

Yes

EuFMD and WOAH standards

TOR9: SCIENTIFIC MEETINGS

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

No

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

Yes

Title of event	Date (mm/yy)	Location	Role (speaker, presenting poster, short communications)	Title of the work presented
4th GF-TADs Eastern Africa Roadmap meeting for Foot-and-Mouth Disease	2022-03-01	Virtual	Observer	

TOR10: NETWORK WITH WOAH REFERENCE LABORATORIES

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

Yes

24. Are you a member of a network of WOAH 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.

25. Did you organise or participate in inter-laboratory proficiency tests with WOAH 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.
Virological and serological diagnosis of FMD	Participant		Pirbright Institute

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

No

TOR11: OTHER INTERLABORATORY PROFICIENCY TESTING

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

Yes

Purpose for inter-laboratory test comparisons1	**Role of your reference laboratory (organizer/participant)**	**No. participating laboratories**	**Region(s) of participating WOAH Member Countries**
Virological and serological diagnosis of FMD	Organiser	46	Africa Europe

TOR12: EXPERT CONSULTANTS

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

Yes

KIND OF CONSULTANCY	Location	SUBJECT (FACULTATIVE)
Review of manual chapter		

29. Additional comments regarding your report:

No