OIE Reference Laboratory Reports Activities

Activities in 2020

This report has been submitted : 2021-01-12 22:28:04

Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Rabies
Address of laboratory:	New Haw Addlestone Surrey KT15 3NB UNITED KINGDOM
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Website:	www.defra.gov.uk/apha
Name (including Title) of Head of Laboratory (Responsible Official):	Mr. Christopher Hadkiss (APHA Chief Executive)
Name (including Title and Position) of OIE Reference Expert:	Professor Anthony R. Fooks (PhD) Head of OIE Reference Laboratory (Rabies)
Which of the following defines your laboratory? Check all that apply:	Governmental

ToR 1: To use, promote and disseminate diagnostic methods validated according to OIE Standards

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 OIE Manual (Yes/No)	Total number of test performed last year	
Indirect diagnostic tests		Nationally	Internationally
FAVN	Yes	5000	10000
Direct diagnostic tests		Nationally	Internationally
FAT	Yes	415	17
RTCIT	Yes	2	0
Real time Taqman / SYBR RT-PCR	Yes	185	17
Reverse-transcriptase Polymerase Chain	Yes	2	10

ToR 2: To develop reference material in accordance with OIE requirements, and implement and promote the application of OIE Standards.
To store and distribute to national laboratories biological reference products and any other reagents used in the diagnosis and control of the designated pathogens or disease.

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

No

3. Did your laboratory supply standard reference reagents (non OIE-approved) and/or other diagnostic reagents to OIE Member Countries?

Yes

Type of reagent available	Related diagnostic test	Produced/ provide	Amount supplied nationally (ml, mg)	Amount supplied internationally (ml, mg)	No. of recipient OIE Member Countries	Region of recipients
Challenge Virus Standard (CVS)	PCR, RTCIT	Provided.	0	1 ml	1	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East

4. Did your laboratory produce vaccines?

No

5. Did your laboratory supply vaccines to OIE Member Countries?

No

ToR 3: To develop, standardise and validate, according to OIE Standards, new procedures for diagnosis and control of the designated pathogens or diseases

6. Did your laboratory develop new diagnostic methods validated according to OIE Standards for the designated pathogen or disease?

Yes

7. Did your laboratory develop new vaccines according to OIE Standards for the designated pathogen or disease?

No

Name of the new test or diagnostic method or vaccine developed	Description and References (Publication, website, etc.)
Virus neutralisation test.	Cherry Red Virus neutralisation test employing a synthetically produced fluorescently labelled rabies virus to avoid the need for expensive conjugated antibodies. Validation to OIE standards is underway.
Micro-neutralisation test.	A microneutralisation test using small volumes of serum has been developed for use in serosurveillance studies. Validation and reproducibility testing to OIE standards is underway.

ToR 4: To provide diagnostic testing facilities, and, where appropriate, scientific and technical advice on disease control measures to OIE Member Countries

8. Did your laboratory carry out diagnostic testing for other OIE Member Countries?

Yes

Name of OIE Member Country seeking assistance	Date (month)	No. samples received for provision of diagnostic support	No. samples received for provision of confirmatory diagnoses
SOUTH AFRICA	January	399	0
JORDAN	February	17	0
SOUTH AFRICA	February	784	0
SOUTH AFRICA	March	242	0
SOUTH AFRICA	June	729	0
SOUTH AFRICA	July	385	0
SOUTH AFRICA	August	162	0
SOUTH AFRICA	September	404	0
SOUTH AFRICA	October	286	0
SOUTH AFRICA	Novenmber	325	0

9. Did your laboratory provide expert advice in technical consultancies on the request of an OIE Member Country?

Yes

Name of the OIE Member Country receiving a technical consultancy	Purpose	How the advice was provided
SOUTH AFRICA	Advice and consultancy for rabies serology.	Technical reports / SOPs.
SINGAPORE	Advice and support for rabies virus culture and diagnostic testing.	Email correspondence / SOPs provided.
JORDAN	Training, advice and consultancy.	Email correspondence / SOPs provided.
INDIA	OIE Twinning Final Report. India RL (Rabies) submission to the OIE BSC / GA.	Technical and strategic advice and consultancy.

ToR 5: To carry out and/or coordinate scientific and technical studies in collaboration with other laboratories, centres or organisations

10. Did your laboratory participate in international scientific studies in collaboration with OIE Member Countries other than the own?

Yes

Title of the study	Duration	Purpose of the study	Partners (Institutions)	OIE Member Countries involved other than your country
EU-funded H2020 'Development of Next-Generation Duel-Target Rabies/Flavivirus Infectious DNA (iDNA) Vaccine' [RABYD-VAX; https://rabyd-vax.eu]	4-years (2017-21).	Vaccine development.	4	BELGIUM
EU-funded H2020 'European Virus Archive Global [EVAg;https://www.european-virus-archive.com]	4-years (2020-23).	Characterisation of rabies virus isolates.	35	FRANCE
CTR Biosciences Fellowship program.	6-mths (2020).	Rabies research studies and training.	1	JORDAN
Neutralisation tests of bat sera against Lagos bat lyssaviruses	4-mths (2020).	Collaborative studies and training.	1	SOUTH AFRICA
CEPI-funded assessment of protection afforded by a self-amplifying RNA vaccine against rabies.	1.5-years (2019-21).	Vaccine development.	1	UNITED STATES OF AMERICA

ToR 6: To collect, process, analyse, publish and disseminate epizootiological data relevant to the designated pathogens or diseases

11. Did your Laboratory collect epizootiological data relevant to international disease control?

Yes

If the answer is yes, please provide details of the data collected:
Nationally, surveillance data from passive surveillance programmes (wild bats, zoo bats) and targeted testing (suspect animals and humans, deaths in quarantine and illegal landings) is collected. From an international perspective, whole viral genomic data is collated to inform rabies elimination programmes.

12. Did your laboratory disseminate epizootiological data that had been processed and analysed?

Yes

If the answer is yes, please provide details of the data collected:
National data (including positive cases) is reported to the UK Government (veterinary & public health departments) and subsequently reported to WHO (Rabies Bulletin Europe quarterly reports, Annual Zoonosis Reports), EFSA (annual reports), OIE (case/incident reports) and EU (via EURL).

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

a) Articles published in peer-reviewed journals: 9

Brunker, K., G. Jaswant, S. M. Thumbi, K. Lushasi, A. Lugelo, A. M. Czupryna, F. Ade, G. Wambura, V. Chuchu, R. Steenson, C. Ngeleja, C. Bautista, D. L. Manalo, M. R. R. Gomez, M. Chu, M. E. Miranda, M. Kamat, K. Rysava, J. Espineda, E. A. V. Silo, A. M. Aringo, R. P. Bernales, F. F. Adonay, M. J. Tildesley, D. A. Marston, D. L. Jennings, A. R. Fooks, W. Zhu, L. W. Meredith, S. C. Hill, R. Poplawski, R. J. Gifford, J. B. Singer, M. Maturi, A. Mwatondo, R. Biek and K. Hampson (2020). "Rapid in-country sequencing of whole virus genomes to inform rabies elimination programmes." Wellcome Open Res 5; 3.

Horton, D. L., A. C. Breed, M. E. Arnold, G. C. Smith, J. N. Aegerter, L. M. McElhinney, N. Johnson, A. C. Banyard, R. Raynor, I. Mackie, M. J. Denwood, D. J. Mellor, S. Swift, P. A. Racey and A. R. Fooks (2020). "Between roost contact is essential for maintenance of European bat lyssavirus type-2 in Myotis daubentonii bat reservoir: 'The Swarming Hypothesis'." Sci Rep 10(1); 1740.

Ismail, M. Z., N. K. Al-Hamdi, A. N. Al-Amery, D. A. Marston, L. McElhinney, E. Taylor, V. Del Rio Vilas, T. M. Dadan, A. R. Fooks and D. L. Horton (2020). "Quantifying and mapping the burden of human and animal rabies in Iraq." PLoS Negl Trop Dis 14(10); e0008622.

Klein, A., A. Fahrion, S. Finke, M. Eyngor, S. Novak, B. Yakobson, E. Ngoepe, B. Phahladira, C. Sabeta, P. De Benedictis, M. Gourlaouen, L. A. Orciari, P. A. Yager, C. M. Gigante, M. K. Knowles, C. Fehlner-Gardiner, A. Servat, F. Cliquet, D. Marston, L. M. McElhinney, T. Johnson, A. R. Fooks, T. Muller and C. M. Freuling (2020). "Further Evidence of Inadequate Quality in Lateral Flow Devices Commercially Offered for the Diagnosis of Rabies." Trop Med Infect Dis 5(1); 13.

Rupprecht, C. E., B. Abela-Ridder, R. Abila, A. C. Amparo, A. Banyard, J. Blanton, K. Chanachai, K. Dallmeier, K. de Balogh, V. Del Rio Vilas, H. Ertl, C. Freuling, R. Hill, G. Houillon, M. Jakava-Viljanen, S. Kasemsuwan, J. Lechenet, L. Nel, P. Panichabhongse, S. A. Rahman, T. Tantawichien, J. Vandeputte, W. Viriyabancha, A. Vos, R. Wallace, G. Yale, O. Yurachai and T. Mueller (2020). "Towards rabies elimination in the Asia-Pacific region: From theory to practice." Biologicals 64: 83-95.

Sabeta, C. T., D. A. Marston, L. M. McElhinney, D. L. Horton, B. M. N. Phahladira and A. R. Fooks (2020). "Rabies in the African Civet: An Incidental Host for Lyssaviruses?" Viruses 12(4); 368.

Wallace, R. M., F. Cliquet, C. Fehlner-Gardiner, A. R. Fooks, C. T. Sabeta, A. A. Setien, C. Tu, V. Vuta, B. Yakobson, D. K. Yang, G. Bruckner, C. M. Freuling, L. Knopf, A. Metlin, P. Pozzetti, P. P. Suseno, S. V. Shadomy, G. Torres, M. A. N. Vigilato, B. Abela-Ridder and T. Muller (2020). "Role of Oral Rabies Vaccines in the Elimination of Dog-Mediated Human Rabies Deaths." Emerg Infect Dis 26(12): 1-9.

Kuhn JH, Adkins S, Alioto D, Alkhovsky SV, Amarasinghe GK, Anthony SJ, Avšič-Županc T, Ayllón MA, Bahl J, Balkema-Buschmann A, Ballinger MJ, Bartonička T, Basler C, Bavari S, Beer M, Bente DA, Bergeron É, Bird BH, Blair C, Blasdell KR, Bradfute SB, Breyta R, Briese T, Brown PA, Buchholz UJ, Buchmeier MJ, Bukreyev A, Burt F, Buzkan N, Calisher CH, Cao M, Casas I, Chamberlain J, Chandran K, Charrel RN, Chen B, Chiumenti M, Choi IR, Clegg JCS, Crozier I, da Graça JV, Dal Bó E, Dávila AMR, de la Torre JC, de Lamballerie X, de Swart RL, Di Bello PL, Di Paola N, Di Serio F, Dietzgen RG, Digiaro M, Dolja VV, Dolnik O, Drebot MA, Drexler JF, Dürrwald R, Dufkova L, Dundon WG, Duprex WP, Dye JM, Easton AJ, Ebihara H, Elbeaino T, Ergünay K, Fernandes J, Fooks AR, Formenty PBH, Forth LF, Fouchier RAM, Freitas-Astúa J, Gago-Zachert S, Gão GF, García ML, García-Sastre A, Garrison AR,

Gbakima A, Goldstein T, Gonzalez JJ, Griffiths A, Groschup MH, Günther S, Guterres A, Hall RA, Hammond J, Hassan M, Hepojoki J, Hepojoki S, Hetzel U, Hewson R, Hoffmann B, Hongo S, Höper D, Horie M, Hughes HR, Hyndman TH, Jambai A, Jardim R, Jiāng D, Jin Q, Jonson GB, Junglen S, Karadağ S, Keller KE, Klempa B, Klingström J, Kobinger G, Kondō H, Koonin EV, Krupovic M, Kurath G, Kuzmin IV, Laenen L, Lamb RA, Lambert AJ, Langevin SL, Lee B, Lemos ERS, Leroy EM, Li D, Lǐ J, Liang M, Liú W, Liú Y, Lukashevich IS, Maes P, Marciel de Souza W, Marklewitz M, Marshall SH, Martelli GP, Martin RR, Marzano SL, Massart S, McCauley JW, Mielke-Ehret N, Minafra A, Minutolo M, Mirazimi A, Mühlbach HP, Mühlberger E, Naidu R, Natsuaki T, Navarro B, Navarro JA, Netesov SV, Neumann G, Nowotny N, Nunes MRT, Nylund A, Økland AL, Oliveira RC, Palacios G, Pallas V, Pályi B, Papa A, Parrish CR, Pauvolid-Corrêa A, Pawęska JT, Payne S, Pérez DR, Pfaff F, Radoshitzky SR, Rahman AU, Ramos-González PL, Resende RO, Reyes CA, Rima BK, Romanowski V, Robles Luna G, Rota P, Rubbenstroth D, Runstadler JA, Ruzek D, Sabanadzovic S, Salát J, Sall AA, Salvato MS, Sarpkaya K, Sasaya T, Schwemmle M, Shabbir MZ, Shí X, Shí Z, Shirako Y, Simmonds P, Širmarová J, Sironi M, Smither S, Smura T, Song JW, Spann KM, Spengler JR, Stenglein MD, Stone DM, Straková P, Takada A, Tesh RB, Thornburg NJ, Tomonaga K, Tordo N, Towner JS, Turina M, Tzanetakis I, Ulrich RG, Vaira AM, van den Hoogen B, Varsani A, Vasilakis N, Verbeek M, Wahl V, Walker PJ, Wang H, Wang J, Wang X, Wang LF, Wèi T, Wells H, Whitfield AE, Williams JV, Wolf YI, Wú Z, Yang X, Yáng X, Yu X, Yutin N, Zerbini FM, Zhang T, Zhang YZ, Zhou G, Zhou X. (2020). Taxonomic update for phylum Negarnaviricota (Riboviria: Orthornavirae), including the large orders Bunyavirales and Mononegavirales. Arch Virol. 165(12):3023-3072.

Begeman L, Suu-Ire R, Banyard AC, Drosten C, Eggerbauer E, Freuling CM, Gibson L, Goharriz H, Horton DL, Jennings D, Marston DA, Ntiamoa-Baidu Y, Riesle Sbarbaro S, Selden D, Wise EL, Kuiken T, Fooks AR, Müller T, Wood JLN, Cunningham AA. (2020). Experimental Lagos bat virus infection in straw-colored fruit bats: A suitable model for bat rabies in a natural reservoir species. PLoS Negl Trop Dis. 14(12):e0008898.

b) International conferences: 3
OIE United Against Rabies: 'One Health in Action - Partnering for Success' webinar [Sept 2020].

Rabies in the Americas (RITA), Virtual (poster presentation) [Oct. 2020].

World Rabies Day 2020 'Rabies in Central Asia' webinar (keynote presentation) [Oct 2020].

c) National conferences: 0

d) Other:
(Provide website address or link to appropriate information) 1
European Virus Archive EVA-Global pre-start meeting, Marseille, France [Feb. 2020].
https://www.european-virus-archive.com/

ToR 7: To provide scientific and technical training for personnel from OIE Member Countries
To recommend the prescribed and alternative tests or vaccines as OIE Standards

14. Did your laboratory provide scientific and technical training to laboratory personnel from other OIE Member Countries?

Yes

a) Technical visits: 0
b) Seminars: 0
c) Hands-on training courses: 0
d) Internships (>1 month): 2

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
(d)	Jordan	1
(d)	Nigeria / South Africa	1

ToR 8: To maintain a system of quality assurance, biosafety and biosecurity relevant for the pathogen and the disease concerned

15. Does your laboratory have a Quality Management System?

Yes

Quality management system adopted	Certificate scan (PDF, JPG, PNG format)
UKAS accredited to BS EN ISO 17025:2005.	UKAS Report_APHA_Dec 2020.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
Fluorescent antibody virus neutralisation test (FAVN)	UKAS (ISO17025:2005)
Fluorescent antibody test (FAT)	UKAS (ISO17025:2005)
Taqman real-time RT-PCR (Real time RT-PCR)	UKAS (ISO17025:2005)
SYBR real-time RT-PCR	UKAS (ISO17025:2005)
Conventional reverse-transcriptase PCR (RT-PCR)	UKAS (ISO17025:2005)
Rabies tissue culture isolation test (RTCIT)	UKAS (ISO17025:2005)
Detection of Rabies Virus Antigen by H&E and IHC	UKAS (ISO17025:2005)

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

Yes

(See Manual of Diagnostic Tests and Vaccines for Terrestrial Animals, Chapter 1.1.4)

ToR 9: To organise and participate in scientific meetings on behalf of the OIE

18. Did your laboratory organise scientific meetings on behalf of the OIE?

No

19. Did your laboratory participate in scientific meetings on behalf of the OIE?

Yes

Title of event	Date (mm/yy)	Location	Role (speaker, presenting poster, short communications)	Title of the work presented
OIE Rabies Network meeting.	07/20	Webinar	Participant.	Not applicable.
OIE United Against Rabies: 'One Health in Action - Partnering for Success'.	09/20	Webinar	Participant.	Not applicable.
World Rabies Day 2020 'Rabies in Central Asia'.	10/20	Webinar	Keynote speaker	Challenges in eliminating dog-mediated human rabies.

ToR 10: To establish and maintain a network with other OIE Reference Laboratories designated for the same pathogen or disease and organise regular inter-laboratory proficiency testing to ensure comparability of results

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

Yes

21. Was your laboratory involved in maintaining a network with OIE Reference Laboratories designated for the same pathogen or disease by organising or participating in proficiency tests?

Yes

Purpose of the proficiency tests: [1]	Role of your Reference Laboratory (organiser/ participant)	No. participants	Participating OIE Ref. Labs/ organising OIE Ref. Lab.
ANSES international rabies serology scheme.	Participant	>80	UK, Germany, Canada, South Africa, USA / France ANSES (organiser).
ANSES international rabies diagnostic proficiency scheme (FAT, RTCIT and PCR).	Participant	>50	UK, Germany, Canada, South Africa, USA / France ANSES (organiser).

[1] *validation of a diagnostic protocol: specify the test; quality control of vaccines: specify the vaccine type, etc.*

22. Did your laboratory collaborate with other OIE 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 OIE Reference Laboratories
OIE Twinning Project	Assessment of the KVAFSU-CVA laboratory in India.	CDC (USA), KVAFSU-CVA (India).
Surveillance of bat lyssaviruses in the UK.	Whole genome sequencing of EBLV-1 in the UK compared with European EBLV-1 sequences.	ANSES (France).
Assessment of diagnostic tests for rabies.	Assessment of Lateral Flow Devices for the diagnosis of rabies.	KVI (Israel), OVI (South Africa), CFIA (Canada), FLI (Germany), CDC (USA) & ANSES (France).
Diagnosis of rabies in animal species.	Investigation of rabies in the African Civet.	OVI (South Africa).
Vaccine assessment in animals.	Assessment of oral rabies vaccines in the elimination of dog-mediated human rabies deaths.	CDC (USA), ANSES (France), CFIA (Canada), OVI (South Africa), KVI (Israel), APQA (Republic of South Korea), SENASICA (Mexico), CVRI (China), IDAH (Romania).

ToR 11: To organise inter-laboratory proficiency testing with laboratories other than OIE Reference Laboratories for the same pathogens and diseases to ensure equivalence of results

23. Did your laboratory organise or participate in inter-laboratory proficiency tests with laboratories other than OIE Reference Laboratories for the same disease?

Yes

Note: See Interlaboratory test comparisons in: Laboratory Proficiency Testing at: http://www.oie.int/en/our-scientific-expertise/reference-laboratories/proficiency-testing see point 1.3

Purpose for inter-laboratory test comparisons[1]	No. participating laboratories	Region(s) of participating OIE Member Countries
VETQAS national rabies serology scheme (FAVN).	>2	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East

ToR 12: To place expert consultants at the disposal of the OIE

24. Did your laboratory place expert consultants at the disposal of the OIE?

Yes

Kind of consultancy	Location	Subject (facultative)
Technical advice.	Virtual (Mar 2020).	Animal Health Laboratory Support to Public Health Response in meeting surge capacity for COVID-19 diagnostics.
Review of OIE Standards.	Written update (Oct 2020).	On behalf of UK, review of chapters for the OIE Terrestrial Manual.
Technical support.	Virtual (Nov 2020).	Participation in the OIE Rabies Laboratories Network (RABLAB).
Review of OIE Standards.	Written update (Dec 2020).	Review of modules for Global Laboratory Leadership Programme (GLLP).

25. Additional comments regarding your report:

Dr Fooks led the OIE Twinning Project in liaison with Dr Wallace (CDC-USA) to support the KVAFSU-CVA Rabies Diagnostic Laboratory, Veterinary College, KVAFSU, Bangalore, India, which was successfully designated as an OIE Reference Laboratory for rabies with Dr Shrikrishna Isloor as the designated expert.

The book 'Rabies: Scientific Basis of the Disease and Its Management' (2020). Anthony R. Fooks (editor), Alan C. Jackson (editor), Elsevier, The Netherlands, included state-of-the-art chapters on rabies written by experts from the OIE Rabies Network.

Dr Fooks has submitted a laboratory twinning project for consideration by the OIE BSC. If approved, the aim of the twinning project will be to develop and support specialist capability in Sierra Leone in the area of Rabies. This partnership is between the OIE International Reference Laboratory for Rabies at the Animal and Plant Health Agency, Weybridge, together with Sierra Leone Central Veterinary Laboratory, Teko, in Makeni, Sierra Leone.