OIE Reference Laboratory Reports Activities

Activities in 2020

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Name of disease (or topic) for which you are a designated OIE Reference Laboratory:	Rabies
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Name (including Title) of Head of Laboratory (Responsible Official):	Dr. Thomas Müller
Name (including Title and Position) of OIE Reference Expert:	Dr. Thomas Müller Dr. Conrad Freuling Senior scientist
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
RFFIT	yes	156	189
FAVN	yes	0	14
ELISA	no	248	133
Direct diagnostic tests		Nationally	Internationally
FAT	yes	273	52
RTCIT	yes	45	0
realtime PCR	yes	214	36
Vaccine batch titration	no	0	46
Sequencing	no	20	35

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
FITC labelled anti-rabies conjugate	FAT	commercial	0	3	1	☒Africa ☐Americas ☐Asia and Pacific ☐Europe ☐Middle East
FITC labelled anti-rabies conjugate	FAT	OVI South Africa	0	2	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.)
Indirect rabies antibody detection test	Development and validation of an indirect fluorescent antibody test for detection of rabies specific antibodies using GFP and other versatile biological marker labelled viruses

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?

No

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
SRI LANKA	Counselling on appropriate measures to prevent and control the emergence of jackal rabies in the southern parts of Sri Lanka	virtual Zoom meeting
NAMIBIA	Design of App based data captruing for KAP studies	virtual Zoom meeting
NAMIBIA	Options to assess dog vaccination coverage in teh NCAs	virtual Zoom meeting
NAMIBIA	Establishment of alternative anti-rabies conjugtaes for FAT	virtual Zoom meeting

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
Dog rabies elimination in Namibia	ongoing	Provision of OIE/WHO standards, expert opinion and technical support on dog rabies elimination in northern communal areas in Namibia	OIE; Ministry of Agriculture, Water & Forestry, CVL Windhoek, Namibia	NAMIBIA
Phylogenetic analysis of RABV from the Northern Namibia	ongoing	Molecular characterization and pathogenesis of recent RABVs from the rabies elimination programme area in the northern communal areas of the country	CVL Windhoek, Namibia	NAMIBIA
Virus-host interaction of phylogroup II lyssaviruses	3 years	Pathogenicity of Lagos bat virus in its reservoir host	University of Ghana; APHA Weybridge, UK; University of Cambridge, UK; Erasmus University, Rotterdam, The Netherlands	GHANA
Performance of commercially available lateral flow devices (LFDs) for rabies	1 year	Assessment of sensitivity and specificity of commercially available lateral flow devices (LFDs) for rabies	OIE-Rls France, South Africa, Canada, USA, UK, Israel, FAO Reference Centre for Rabies, Italy	CANADA GERMANY ISRAEL UNITED KINGDOM UNITED STATES OF AMERICA
Immunogenicity of an oral rabies vaccine in dogs	2 years	Determination of humoral and cellular immune response of Thai dogs after oral vaccination against rabies with the SPBN GASGAS vaccine strain	Faculty of Veterinary Medicine, Kasetsart University, Thailand	THAILAND
Immunogenicity of an oral rabies vaccine in dogs	ongoing	Determination of humoral immune response of African dogs after oral vaccination against rabies with the SPBN GASGAS vaccine strain	Faculty of Veterinary Medicine, University of Namibia, Namibia	NAMIBIA
Revision of post-titer importation waiting period for dogs to be imported from infected countries or zones	ongoing	To provide expert opinion to the OIE regarding the post-titer importation waiting period for dogs to be imported from infected countries or zones	OIE-RL, CDC Atlanta, USA, OIE-RL AHPA Weybridge, UK	UNITED KINGDOM UNITED STATES OF AMERICA
Genetic and antigenetic characterization of the novel Kotalahti bat lyssavirus (KBLV)	3 years	Genetic and antigenetic characterization of the novel Kotalahti bat lyssavirus (KBLV) for taxonimic classification according to ICTV	Finnish Food Authority, Finnland	FINLAND

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:
Rabies surveillance data and geo-coordinates of vaccination areas from European countries (Rabies Bulletin Europe)

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:
Rabies surveillance data and geo-coordinates of vaccination areas from European countries (Rabies Bulletin Europe)

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: 18
Wernike, K. A. Aebischer, A. Michelitsch, D. Hoffmann, C. Freuling, A. Balkema-Buschmann, A. Graaf, C. Grund, T. Müller, N. Osterrieder, M. Rissmann, D. Rubbenstroth, C. Schulz, J. Trimpert, L. Ulrich, A. Volz, T. Mettenleiter, M. Beer. Multi-species ELISA for the detection of antibodies against SARS-CoV-2 in animals. Transbound Emerg Dis. 2020 Nov 15. doi: 10.1111/tbed.13926. Online ahead of print.

Potratz, M., L.M. Zaeck, C. Weigel, A. Klein, C.M. Freuling, T. Müller, S. Finke. 2020. Neuroglia Infection by Rabies Virus after Anterograde Virus Spread in Peripheral Neurons. Acta Neuropathol Commun. 2020 Nov 23;8(1):199. doi: 10.1186/s40478-020-01074-6.

Wallace, R. M., F. Cliquet, C. Fehlner-Gardiner, A. R. Fooks, C. Sabeta, A. Aguilar Setién, C. Tu, V. Vuta, B. Yakobson, D. K. Yang, G. Brückner, C. Freuling, L. Knopf, A. Metlin, P. Pozzetti, P. P. Suseno, S. Shadomy, G. Torres, M. A. N. Vigilato, B. Abela-Ridder, T. Müller. Role of oral rabies vaccines in the elimination of dog-mediated human rabies deaths. Emerg Infect Dis. 2020 Dec;26(12):1-9. doi: 10.3201/eid2612.201266.

Leelahapongsathon, K., S. Kasemsuwan, V. Friedrichs, P. Phawaphutayanchai, K. Bobe, N. Aiyara, C.M. Freuling, T. Müller, A. Vos, T. Pinyopummintr, K. Chanachai. Immune response of Thai dogs after oral vaccination against rabies with the SPBN GASGAS vaccine strain. Vaccines (Basel). 2020 Oct 1;8(4):E573. doi: 10.3390/vaccines8040573

Freuling, C.M., A. Breithaupt, T. Müller, J. Sehl, A. Balkema-Buschmann, M. Rissmann, A. Klein, C. Wylezych, D. Höper, K. Wernike, A. Aebischer, D. Hoffmann, V. Friedrichs, A. Dorhoi, M. Beer, T.C. Mettenleiter. 2020. Susceptibility of raccoon dogs for experimental SARS-CoV-2 infection. Emerg Infect Dis. 2020 Dec;26(12):2982-2985. doi: 10.3201/eid2612.203733. Epub 2020 Oct 22.

Begeman, L., R. Suu-Ire, A. Banyard, C. Drosten, E. Eggerbauer, C. Freuling, L. Gibson, H. Goharriz, D. Horton, D. Jennings, D. Marston, Y. Ntiamoa-Baidu, S. Riesle Sbarbaro, D. Selden, E. Wise, T. Kuiken, A. Fooks, T. Müller, J. Wood and A. Cunningham. 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. 2020 Dec 15;14(12):e0008898. doi: 10.1371/journal.pntd.0008898. Online ahead of print.

Athingo, R., T. Tenzin, A. Coetzer, E. H. Hikufe; J. Peter, L. Hango, T. Haimbodi, J. Lipinge, F. Haufiku, M. Naunyango, M. Kephas, A. Shilongo, K. K. Shoombe, S. Khaiseb, M. Letshwenyo, P. Pozzettii, L. Nake, L. Nel, C. M. Freuling, T. Müller and G. Torres. 2020. Application of the GARC Data Logger - a custom-developed data collection device - to capture and monitor mass dog vaccination campaign in Namibia. PLoS Negl Trop Dis. 2020 Dec 28;14(12):e0008948. doi: 10.1371/journal.pntd.0008948. Online ahead of print.

Baker, L., J. Mathiopoulos, T. Müller, C. Freuling, K. Hampson. 2020. Local rabies transmission and regional spatial coupling in European foxes. PLoS One. 2020 May 29;15(5):e0220592. doi: 10.1371/journal.pone.0220592

Morgenroth, A., V. Jakel, H. Hanke-Robinson, T. Müller, C. Freuling, K. Cussler, K. Duchow, B. Krämer, M. Bastian. 2020. Novel Electrophoretic Immunoblot as Antigen Desorption and Quantification Method for Alum-adjuvanted Veterinary Rabies Vaccines, Vaccine Jun 2;38(27):4281-4287. doi: 10.1016/j.vaccine.2020.04.057 Titel anhand dieser DOI in Citavi-Projekt übernehmen. Epub 2020 May 8.

Denzin, N., F. J. Conraths, T. C. Mettenleiter, C. M. Freuling and T. Müller. 2020. Monitoring of pseudorabies in wild boar of Germany—A spatiotemporal analysis. Pathogens 9, 276; doi:10.3390/pathogens9040276

Schlottau, K., E. Eggerbauer, C. M. Freuling, M. Beer, T. Müller and B. Hoffmann. 2020. Rapid molecular species identification of indigenous bats from Germany for surveillance purposes. Infection, Genetics and Evolution. 78(Mar 2020): 104140.

Orlowska, A., M. Smreczak, C. M. Freuling, T. Müller, P. Trebas and J. Rola. 2020. Serological Survey of Lyssaviruses in Polish Bats in the Frame of Passive Rabies Surveillance Using an Enzyme-Linked Immunosorbent Assay. Viruses. 12(3): 271.

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

te Kamp, V., C. M. Freuling, A. Vos, P. Schuster, C. Kaiser, S. Ortmann, A. Kretzschmar, S. Nemitz, E. Eggerbauer, R. Ulrich, J. Schinköthe, T. Nolden, T. Müller and S. Finke. 2020. Responsiveness of various reservoir species to oral rabies vaccination correlates with differences in vaccine uptake of mucosa associated lymphoid tissues. Scientific Reports. 10: 1-14.

Potratz, M., L. Zaeck, M. Christen, V. te Kamp, A. Klein, T. Nolden, C. M. Freuling, T. Müller and S. Finke. 2020. Astrocyte Infection during Rabies Encephalitis Depends on the Virus Strain and Infection Route as Demonstrated by Novel Quantitative 3D Analysis of Cell Tropism. Cells. 9(2): 412.

Klein, A., A. S. Fahrion, S. Finke, M. Eyngor, S. Novak, B. Yakobson, E. C. Ngoepe, B. Phahladira, C. T. 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. A. Marston, L. M. McElhinney, T. Johnson, A. R. Fooks, T. Müller and C. M. Freuling. 2020. Further Evidence of Inadequate Quality in Lateral Flow Devices Commercially Offered for the Diagnosis of Rabies. Tropical Medicine and Infectious Disease. 5(1): 13.

Calvelage, S., M. Smreczak, A. Orlowska, C. M. Freuling, T. Müller, C. Fehlner-Gardiner, S. Nadin-Davis, D. Höper and P. Trebas. 2020. Population- and Variant-Based Genome Analyses of Viruses from Vaccine-Derived Rabies Cases Demonstrate Product Specific Clusters and Unique Patterns. Viruses. 12(1): 115.

Athingo, R., T. Tenzin, A. Shilongo, E. H. Hikufe, K. K. Shoombe, S. Khaiseb, J. van der Westhuizen, M. Letshwenyo, G. Torres, T. C. Mettenleiter, C. M. Freuling and T. Müller. 2020. Fighting Dog-Mediated Rabies in Namibia—Implementation of a Rabies Elimination Program in the Northern Communal Areas. Tropical Medicine and Infectious Disease. 5(1): 12.

b) International conferences: 3
UAR Rabies Meeting, 22 September 2020

Africa Rabies Webinar – Updates on Rabies Elimination efforts in Africa Region, 23-24 September 2020

31st Rabies in the Americas (RITA), online conference, 28-30 October 2020

c) National conferences: 0

d) Other:
(Provide website address or link to appropriate information) 2
Rabies Bulletin Europe: http://www.who-rabies-bulletin.org/
Website of FLI: www.fli.bund.de

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

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
a	Namibia	2

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)
ISO 17025/2018	Akkreditierungsurkunde_FLI-Riems-Jena_2019.pdf

16. Is your quality management system accredited?

Yes

Test for which your laboratory is accredited	Accreditation body
FAT	Deutsche Akkreditierungsstelle GmbH (DAkkS)
RTCIT	Deutsche Akkreditierungsstelle GmbH (DAkkS)
realtime PCR	Deutsche Akkreditierungsstelle GmbH (DAkkS)
RFFIT	Deutsche Akkreditierungsstelle GmbH (DAkkS)
FAVN	Deutsche Akkreditierungsstelle GmbH (DAkkS)
virus titration	Deutsche Akkreditierungsstelle GmbH (DAkkS)

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
• Africa Rabies Webinar – Updates on Rabies Elimination efforts in Africa Region,	23-24 September	virtual	presenter	German - NAmibian OIE Laboratory Twinning Project on Rabies
Meeting of the OIE BSC	17 September	virtual	presenter	OIE RABLAB - OIE Reference Laboratory Network on Rabies
UNITED AGAINST RABIES: One Health in Action—Partnering for Success	22 September	virtual	presenter	Implementation of adequate rabies surveillance

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.
Rabies serology proficiency testing (FAVN)	participant	>50	OIE-RL ANSES Nancy, France (organising Lab)
Interlaboratory comparison test on dRIT and FAT	participant	>80	OIE-RL ANSES Nancy, France (organising Lab)

[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
Pathogenicity of novel phylogroup III lyssaviruses	Pathogenicity of GRBV in mice and ferrets	OIE-RL AHPA Weybridge, UK
Performance of commercially available lateral flow devices (LFDs) for rabies	Assessment of sensitivity and specificity of commercial available lateral flow devices (LFDs) for rabies	OIE-Rl Malzeville, France, OIE-RL Onderstepoort, South Africa, OIE-RL, Nepean, Canada, OIE-RL, CDC Atlanta, USA, OIE-RL, Bet-Dagan, Israel,
Phylogenetic analysis of RABV from the Northern Namibia	Molecular characterization and pathogenesis of recent RABVs from the rabies elimination programme area in the northern communal areas of the country	OIE-RL AHPA Weybridge, UK
Revision of post-titer importation waiting period for dogs to be imported from infected countries or zones	To provide expert opinion to the OIE regarding the post-titer importation waiting period for dogs to be imported from infected countries or zones	OIE-RL, CDC Atlanta, USA, OIE-RL AHPA Weybridge, UK
Full-genome Sequences and Phylogenetic Analysis of Archived Danish European Bat Lyssavirus 1 (EBLV-1) Isolates	Comprehensive assessment of genetic resolution and spatial segregation of EBLV- sublineage 1a	OIE-RL AHPA Weybridge, UK
Implementation of an OIE Reference Laboratories Network on Rabies	drafting of final network concept documents summarising the goals, objectives, planned activities, criteria for membership and proposed laboratories	OIE-RL, CDC Atlanta, USA
OIE ad hoc Group on rabies	Evaluation of official control programmes for dog-mediated rabies	OIE-RL, CDC Atlanta, USA

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
inter-laboratory test comparisons on PCR for the detection of Suid Herpes Virus 1	20	☐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)
ad hoc Group Meeting on rabies	virtual	provide expert opinion to the OIE regarding the post-titer importation waiting period for dogs to be imported from infected countries or zones
responding to specific technical queries from OIE	virtual	• Drafting of final network concept documents for the OIE Rabies Laboratories Network on Rabies (RABLAB) summarising the goals, objectives, planned activities, criteria for membership and proposed laboratories
ad hoc Group Meeting on rabies	virtual	evaluation of official control programmes for dog-mediated rabies for OIE endorsement
OIE Commission meetings	virtual	OIE RABLAB - OIE Rabies Reference laboratories Network Initiative

25. Additional comments regarding your report:

Due to the ongoing SARS-Cov-2 pandemic activities within the OIE Laboratory Twinning Project between FLI and CVL Windhoek scheduled for 2020 could not be conducted as planned.