OIE Collaborating Centres Reports Activities

Activities in 2021

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Title of collaborating centre:	Zoonoses in Europe
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ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE

Disease control	
Title of activity	**Scope**
Avian Influenza: HPAI H5 outbreaks in Germany and Europe	Continuing from 2020, the largest number of cases of HPAI H5(N8 as well as N1) in wild birds and poultry holdings ever was observed in Germany in 2021. Similarly severe outbreak scenarios were reported in other European countries. Phylogenetic evidence has been obtained that is suggestive of endemic entrenchment of HPAI viruses H5 of the goose/Guangdong lineage in metapopulations of wild birds in northern Europe during 2021.
Technical Support for Namibia in Eliminating Rabies in Dogs	Assessment of epidemiological surveillance data; Monitoring of vaccination campaigns; Optimization of implemented vaccination strategy, Implementation of an oral vaccination field trial in free-roaming dogs in the northern communal areas (NCAs)
Epidemiology, surveillance, risk assessment, modelling	
Title of activity	**Scope**
Studies on Crimean-Congo hemorrhagic fever virus infections in wild deer in Spain	Red deer reveal spatial risks of Crimean- Congo haemorrhagic fever virus infection. CCHFV continues to cause new human diseases in the Iberian Peninsula, although its spatial distribution and ecological determinants are unknown. The virus remains active in a silent tick-animal cycle in which animals contribute to the maintenance of tick populations and the virus itself. Wild ungulates, especially red deer, are important hosts for Hyalomma ticks in the Iberian Peninsula, which are the main vectors of CCHFV. In cooperation with Spanish partners we designed a cross-sectional study, analysed the presence of CCHFV antibodies in 1444 deer from 82 populations and statistically modelled the exposure risk with host and environmental predictors. Fifty out of 82 deer populations were seropositive, with prevalence up to 88% in individual populations. The highest prevalence of CCHFV exposure was found in the south-west of the Iberian Peninsula. Climate and the number of ungulates were the most influential predictors of the risk of exposure to the virus. The regions at highest risk were those where H. lusitanicum was most abundant. Eight of the nine primary human cases occurred in or near these regions, showing that the model accurately predicts infection risk in humans.
Training, capacity building	
Title of activity	**Scope**

OIE Laboratory Twinning Project: viral hemorrhagic fevers (Cameroon)	FLI is participating in the EBOSURSY-programme and twinning with Laboratoire Nationale Vétérinaire (LANAVET), Garoua, Kamerun: Strengthening the capacity of LANAVET in viral hemorrhagic fever diagnostics, preparedness and research to OIE Standard.
OIE Laboratory Twinning Project: rabies (Namibia)	Improvements of rabies diagnostic capacities and capabilities of the Central Veterinary Laboratory, Windhoek: (i) Revision of SOPs, (ii) establishment of realtime PCR, (iii) interlaboratory comparison tests. (iv) enhancement of rabies surveillance, (v) characterization of RABVs
Support of Mauritania during an outbreak of avian influenza virus	In February 2021, FLI supported ONARDEL in Mauritania during an avian influenza outbreak in the country (https://whc.unesco.org/en/news/2249). Pelicans and other wild birds were among those affected. In the course of the outbreak, the FLI provided primers, PCR kits and a protocol for diagnostics.
Zoonoses	
Title of activity	**Scope**
SARS-CoV-2: Studies on susceptibility of animals and on their role in SARS-CoV-2 infections, including diagnostics, pathogen / host interaction and immunology.	FLI continued its research efforts regarding SARS-CoV-2 in animals. A review on “SARS-CoV-2 in animals: From potential hosts to animal models.” was published. Selected further results in 2021 are: “SARS-CoV-2 spike D614G change enhances replication and transmission”: This study revealed for the 1st time the improved fitness of the new virus variant on a molecular basis. The newly developed procedure of viral in vivo competition can be used to assess the potential risk of new virus variants. “Enhanced fitness of SARS-CoV-2 variant of concern Alpha but not Beta”: The replication kinetics of the variants of concerns were compared to the wild type S614G virus both, in vitro and in vivo (ferrets, hamsters, hACE2-expressing mice). “CVnCoV and CV2CoV protect human ACE2 transgenic mice from ancestral B BavPat1 and emerging B.1.351 SARS-CoV-2”: showing that spike encoding mRNA vaccines confer full protection of hACE2-expressing transgenic mice from disease and mortality caused by an ancestral SARS-CoV-2 strain and the Beta variant of concern. “The second wave of SARS-CoV-2 circulation - antibody detection in the domestic cat population in Germany”: A serosurvey revealed a doubling of the seroprevalence in cats during the second wave of virus circulation, indicating a continuous occurrence of transspecies transmission from infected owners to their cats.
Avian and animal influenza	Despite the media presence of the SARS-Cov-2 pandemic, influenza A viruses remain at the top of concern regarding zoonotic potential. In particular, the continuing and even spreading endemic entrenchment of HPAI H5 viruses of the goose/Guangdong lineage in Asia, Europe and Africa, the resurgence of antigenically altered strains of the Chinese H7N9 viruses and the heavy load of H9N2 viruses of the G1 lineages in Asia and northern Africa are subjects of severe concern. Study „Evidence for endemic infections of HPAIV H5N1 in northern Europe during summer 2021”: Previously established next generation sequencing tools are used to follow and analyse evolutionary trajectories of goose/Guangdong-like HPAIV in Europe. Study „Mutual transmissions of influenza A viruses at the porcine/human interface in Germany”: Surveillance of domestic pig holdings, the farmers, veterinarians and their families has commenced in 2021 to measure the zoonotic impact of swine influenza viruses.

Highly pathogenic BSL4-viruses (filoviruses, henipaviruses, arenaviruses and Crimean Congo Hemorrhagic Fever virus (CCHFV))	Continuous training of staff; in vitro studies of virus-host interaction and pathogenesis of BSL4-pathogens continued for filoviruses, henipaviruses, arenaviruses; assays for CCHFV were implemented; successful participation in external quality assurance tests of its diagnostic capabilities for filoviruses, arenaviruses, and CCHFV Technology platforms such as FACS analysis and live cell microscopy were established under BSL4 conditions, and are now being used to study virus host-cell interactions and the formation/function of intracellular replication compartments of BSL4 viruses. Selected results include a study demonstrating the efficacy of the antiviral Remdesivir against novel filoviruses, and studies analyzing host interactions of the ebolavirus glycoprotein both with respect to antiviral responses and immune protection.
West Nile virus: occurrence, distribution, monitoring, characterization	The epizootic emergence of WNV was again observed in 2021 in the well-known areas in the eastern part of Germany (Saxony-Anhalt, Saxony, Berlin and Brandenburg). However, the wave of disease was significantly lower in this year. Only, 34 cases of WNV infections in wild- and zoo birds and 18 cases of WNV infections in horses were reported for 2021. First phylogenetic analyses show the circulation of WNV lineage 2 as described for the former years. Furthermore, only three cases of WNV infection in humans were described (region Berlin/Brandenburg, identified by Institute of Virology Charitè, Berlin). The WNV and USUV monitoring studies based on the German monitoring network is ongoing in 2021 and again hundreds of wild bird blood samples were examined by molecular and serological methods. We found Berlin as a hotspot region, with a high proportion of PCR-positive signals and/or high specific WNV-antibody titers in several resident birds. No final results for 2021 from this network are yet available for Germany, due to the ongoing corona pandemic with personnel problems.
Arthropod vector monitoring and studies of the vector-pathogen interactions:	Maintenance of BSL2 and BSL3 insectaries to breed and study mosquitoes, ticks and biting midges. Laboratory colonies of several invasive and native mosquito species and strains, some hard and soft tick species and a biting midge species (Culicoides) are available. Current work includes studies on vector competence for viruses, bacteria and filarial worms and on ecological aspects of vector species, e.g. temperature tolerance and competitive development. Passive and active monitoring to gain information about occurrence, distribution and ecology of mosquito species in Germany is conducted by trapping and the citizen science project 'Mueckenatlas'. In addition, a monitoring project on German ceratopogonids is running and ticks are also monitored in Northeastern Germany. Current study efforts include the vector competence of mosquitoes for RVFV and the influence of coinfections with different flaviviruses on vector competence
Borna Disease Virus 1 (BoDV-1) and variegated squirrel bornavirus 1 (VSBV-1).	In autumn 2020 a national reference laboratory for Bornavirus Infections in Animals was established at FLI. Focusing on phylogeographic analysis of the occurrence of BoDV-1 in reservoir and spill-over hosts and on the optimization of diagnostic tests a first proficiency test was performed in December 2021 with 17 participating laboratories. In 2021 at least six cases of zoonotic BoDV-1 transmission to humans, resulting in fatal encephalitis, were detected, whereas VSBV-1 was neither detected in animals nor humans.

Transmissible spongiforme encephalopathies (BSE, scrapie, CWD, etc.)	In 2021 the first BSE case since 2014 has been confirmed in a 14 year old Pinzgauer cow (endangered breed) from Bavaria. By means of discriminatory immunoblot the case was diagnosed as L-Type BSE. The NRL for TSE will perform the discriminatory BSE/TSE testing in cattle and small ruminants for Austria. Native and formalin fixed material of confirmed BSE and Classical Scrapie cases will be send from AGES to FLI for further diagnostic purposes. The project “Tackling chronic wasting disease in Europe (TCWDE)” will integrate epidemiological and population dynamic approaches with experimental studies on the host/pathogen interaction, and allow conclusions on the spread and transmission of European CWD to wildlife, livestock and humans.
Animal and Human Brucellosis in Kyrgyzstan, Tunisia, Pakistan, Ägypten & Iran	Brucellosis is a severe disease in humans and causes massive financial losses to the economy of developing countries. In Pakistan the disease is endemic but neglected in human and animal health. The aim of this comprehensive research is to highlight the prevalence in humans and animals, thus relevant authorities and family doctors will be aware of the steadily emerging threat brucellosis is causing and countermeasures will be set in force accordingly. Research is done on prevalence and spatial distribution of brucellosis in animals and humans including brucellosis in dogs and equids; acute brucellosis in humans, prevalence in hospital patients, occupational risks and risks for pregnant women and unborn life.
Q fever (Coxiella burnetii) diagnosis and transmission)	Determination of the vector competence for transmission of Coxiella burnetii by Dermacentor marginatus and Ixodes ricinus ticks using an artificial tick feeding model. Phenotypic and genotypic characterization of Coxiella burnetii isolates from different hosts for analysis of the isolate-specific virulence. Analysis of Coxiella burnetii shedding dynamics in ewes from meat flocks in Saint Kitts should identify the groups (pregnant vs post-parturient; multiparous vs. primiparous; abortion vs. normal parturition) and routes (vaginal mucous, feces, milk, placenta) with higher risk of shedding, being potential sources of infection for animals and humans.
Phylogeny and pathogenic potential of Clostridium species	In silico genome analysis of Clostridium perfringens discovered stable phylogroups with different genome characteristics and pathogenic potential. Establishment of a publicly available core genome multilocus sequence typing scheme for Clostridium perfringens. Genome sequence analysis of Clostridium chauvoei strains of European origin and evaluation of typing options for outbreak investigations. Comparative analysis of Clostridium septicum genomes, insights into the taxonomy, species genetic diversity, and virulence related to gas gangrene.
ESKAPE pathogens in a global One Health approach	Acinetobacter spp and Klesbsiella spp. are emerging pathogens in animal and human medicine but are still neglected in developed and developing countries. Thus the risk caused by these bacteria is investigated globally in a One Health approach in Germany, Vietnam and Nigeria considering the human, food production and animal interfaces.
Yersinia as model agents for development of pathogenicity and host adaption	Yersina infections cause severe disease in humans e.g. plague (Y. pestis) and in animals (Y. pseudotuberculosis). Little is known on the development of pathogenic variants, their adaption to humans or prevalence in the animal reservoirs. Aim of this research is to unravel some of interactions by investigating the development of Y. pestis, Y. pseudotuberculosis and Y. similis from a common progenitor by molecular techniques. Field work in animal populations as well research on isolates from humans and animals is carried out.

Tick-borne diseases	Prevalence of bovine Anaplasmosis in countries of North Africa and the Middle East based on data from the Literature. Prevalence of Anaplasma spp., Coxiella burnetii and Rickettsia spp. in ticks collected from wild and domestic animals in Punjab, Pakistan.
Glanders: Evaluation of horse sera from Canada for possible use as a national reference serum in Canada.	Correct diagnostics is based on the use of true positive and negative reference materials. For such validation, the FLI tested 63 selected horse sera from Canada using all currently relevant methods and provided the detailed results to the Canadian colleagues.
Molecular Characterization of Staphylococcus aureus Isolated from animals, Human and Food Samples in Algeria	Staphylococcus aureus is a commensal resident of the skin and nasal cavities of humans and can cause various infections. In a collaboration with several Universities in Algeria, studies on Staphylococci isolates and sample materials from farm animals are ongoing. The epidemiological situation in the country is to be analyzed in more detail from a One Health perspective in order to improve diagnostic capabilities and successfully establish comprehensive control programs.
Identification and characterization of multidrug-resistant ESBL-producing Salmonella enterica serovars Kentucky and Typhimurium isolated in Tunisia	Molecular characterization of extended-spectrum β-lactamases (ESBLs) among Salmonella Kentucky and Typhimurium isolates: partial sequence analysis of the types of β-lactamases found in these isolates, clonality, resistance and supposed emergence of ESBL-producing strains. A retrospective study surveyed the ESBLs occurring in a total of 1404 Salmonella Kentucky and Typhimurium isolates collected over a 5-year period in Tunisia. The novel Salmonella cefotaxime-hydrolysing β-lactamase, CTX-M61/TEM-34, detected in this study showed the emergence of new CTX-M-type ESBLs in Tunisia. There were found 33 different multidrug resistance (MDR) patterns. The results of this cooperative work have been published in 2021.
Bacterial gastroenteritis caused by the putative zoonotic pathogen Campylobacter lanienae: First reported case in Germany	Foodborne campylobacteriosis is the most common cause of human bacterial enteritis in Germany. Campylobacter jejuni and Campylobacter coli are the main causative agents for enteric disease. Here, we describe a case of mild Campylobacter lanienae -associated enteritis with subsequent asymptomatic excretion in a butcher. This first reported case of human Campylobacter lanienae campylobacteriosis in Germany demonstrates the agent's likely zoonotic pathogenicity.
Wildlife	
Title of activity	**Scope**
Surveillance of hantaviruses and other pathogens in rodents and other small mammal reservoir hosts	The interdisciplinary research network “rodent-borne pathogens” continued its screening of small mammals for viral, bacterial and parasite pathogens with national and international collaborators. Study “Hantavirus and Leptospira infections in rodent reservoirs”: Investigation of rodents from different European countries (Spain, Austria, Germany, Lithuania) for hantaviruses and Leptospira resulted in new insights into the ecology of these infections in the reservoir hosts. Study „Tula hantavirus as the causative agent of hantavirus disease in an immunocompetent person, Germany“: First detection of a human Tula hantavirus infection.
Diagnosis, biotechnology and laboratory	
Title of activity	**Scope**

Generation of diagnostic tools for detection of zoonotic viruses	In a broad collaboration novel monoclonal antibodies were generated against hepatitis E virus and hantaviruses. Study: “Generation and characterization of a HEV-specific monoclonal antibody” The characterization of a novel anti-HEV monoclonal antibody indicated its broad cross-reactivity with various hepeviruses suggesting its high diagnostic potential.
Organization of ring trials for the detection of relevant agents	Ring trials for CCHFV (PCR) and RVFV (PCR and ELISA) were successfully conducted with partner laboratories in Cameroon, Sierra Leone and Mauritania

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
NGS-MLST genotyping method for Toxoplasma gondii	Toxoplasma gondii is a not systematically controlled zoonotic foodborne pathogen globally. If acquired during pregnancy, Toxoplasma gondii can cause abortion and devastating congenital disease. Particular strains, which are genotypically different from clonal strains common in Europe or Northern America, are a frequent cause of ocular disease and severe toxoplasmosis even in immunocompetent individuals. Highly polymorphic regions in genomes of Toxoplasma gondii are identified using a panel of representative strains. Regions in the genome with a higher SNP density are selected und used to establish a novel high-throughput targeted NGS-MLST-typing method. The novel method, established by One Health EJP TOXOSOURCES, Horizon 2020, is contributing to the harmonization of genotyping Toxoplasma gondii.	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
Development and harmonization of new real time PCR protocols for molecular diagnostics and typing of Echinococcus spp	Infections with eggs of Echinococcus species can cause cystic or alveolar echinococcosis in intermediate host animals and humans. Cost-effective molecular assays with a high discriminative power are needed to investigate the dynamics, pathogenicity and infection routes of members of the genus Echinococcus. Six TaqMan® probe-based qPCRs were established and can be used for the diagnosis of Echinococcus multilocularis and Echinococcus granulosus genotypes in five epidemiologically relevant species and subgroups, i.e. E. granulosus sensu stricto (G1, G3), E. equinus (G4), E. ortleppi (G5), the E. canadensis complex (G6 to G8 and G10), and a single genotype (G8) of the E. canadensis complex as a single-step genotyping technique. It also allows differentiating E. granulosus and E. multilocularis samples from other Echinococcus or Taenia species in samples derived from cystic or fecal material. The novel methods, established by One Health EJP MEME, Horizon 2020, contributes to harmonizing detection and genotyping of Echinococcus spp..	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare
Rabies: Importation of dogs	Proposal for the reduction of the post-titer importation waiting period for dogs to be imported from infected countries or zones	☒Surveillance and control of animal diseases ☐Food safety ☐Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating Centres in other disciplines

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

3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Multiple cooperations with other OIE CCs and RLs as well as other organizations	worldwide	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	FLI collaborates with multiple national and international partner within international research networks and research consortia to gain and share information on animal diseases and zoonoses especially in the One Health context. Active participation in several networks, e.g. - Biosafety Level 4 Zoonotic Laboratory Network (BSL4ZNet) - International alliance against health risks in wildlife trade - Emerging Viruses Disease Laboratory Network (EVD- LabNet) - Sharp consortium: Laboratory preparedness and responsiveness (EU funded Joint Action, Health Programme) - VectorNet: European network for sharing data on the geographic distribution of arthropod vectors, transmitting human and animal disease agents FLI is a leading partner in several multi-actor European procects, e.g. - One Health European Joint Programming (OH-EJP) - Versatile Emerging infectious disease Observatory forecasting, nowcasting and tracking in a changing world (VEO) - One Health AMR Surveillance through Innovative Sampling (OASIS) - Dynamics of avian influenza in a changing world (DELTA-FLU) - European Virus Archive GLOBAL (EVAg) - Veterinary Biocontained facility Network for excellence in animal infectiology research and experimentation (VetBioNet)

ANSES French Agency for Food, Environmental and Occupational Health & Safety	France	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	MoU newly signed in 2021: Strategic cooperation on animal diseases and zoonoses in the context of the One Health approach. Ongoing research projects on different topics: e.g. One Health EJP, EVAg; VetBioNet, ICRAD-projects: ASFVInt, PIGIE, FMDV_PersIstOmics
Institute Pasteur and Institute Pasteur in Guinea	France	☒Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Emerging Diseases: Haemorhagic Fevers (CCHFV, RVFV, Ebola virus, etc.), transboundary diseasesseveral research projects: IMI-ZAPI: Zoonoses Anticipation and Preparedness Initiative and other Horizon2020 projects, e.g.OneHealthEJP; VEO; VetBioNet
Pirbright Institute	UK	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	MoU – Strategic cooperation including joint PhD- programme on topics of common interest: Transboundary diseases, (re-)emerging animal diseases, vector competence studies, poultry immunology) ongoing research projects (Horizon2020): EVAG; Defend; VetBioNet, ICRAD-project: ASFVInt
APHA: Animal and Plant Health Agency	UK	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	One Health: Animal disease and zoonoses several ongoing research projects (Horizon2020): OneHealthEJP; EVAG; Delta-Flu; Defend; VetBioNet; VEO; ICRAD-project: PIGIE
Canadian Food Inspection Agency (CFIA),	Canada	☐Africa ☒Americas ☐Asia and Pacific ☐Europe ☐Middle East	Emerging disease: High consequence viruses and TSEs Biosafety Level 4 Zoonotic Laboratory Network (BSL4ZNet) several ongoing research projects (Horizon2020): e.g. Delta- Flu; Defend
Centers for Disease Control and Prevention (CDC), Atlanta	USA	☐Africa ☒Americas ☐Asia and Pacific ☐Europe ☐Middle East	Emerging and transboundary diseases, OIE-RABLAB (Joint coordination), Biosafety Level 4 Zoonotic Laboratory Network (BSL4ZNet),
Australian Animal Health Laboratory, CSIRO, Geelong, Australia	Australia	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East	Harmonization of diagnostic approaches for zoonotic diseases, participation in ring trials for the detection of henipavirus infections organized by AAHL, Biosafety Level 4 Zoonotic Laboratory Network (BSL4ZNet), Foot and Mouth Disease (FMD Ready Project)
Harbin Veterinary Research Institute (HVRI)□subordinated to the Chinese Academy of Agricultural Sciences (CAAS)	China	☐Africa ☐Americas ☒Asia and Pacific ☐Europe ☐Middle East	Emerging diseases and zoonoses control (High-containment laboratories and animal facilities BSL-3 and BSL-4) OIE-CC for Zoonoses

OIE Rabies Reference Laboratories Network (RABLAB)	worldwide	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	A key technical resource and information platform in strengthening high-quality laboratory capacity and improving laboratory-based rabies surveillance in countries around the world. FLI and CDC are coordinators of the network.
ZODIAC (Zoonotic Disease Integrated Action Project – Early Detection and Global Response	worldwide	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	ZODIAC: An IAEA initiative towards the early detection and prevention of the next zoonotic outbreaks; moving forward from COVID-19; FLI is national contact point for Germany
PREZODE (Preventing Zoonotic Disease Emergence)	worldwide	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	PREZODE: An international initiative addressing all the challenges related to the prevention, surveillance, early detection and rapid response to risks of zoonotic pandemics.

4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Multiple cooperations with other OIE CCs and RLs as well as other organizations	worldwide	☒Africa ☒Americas ☒Asia and Pacific ☒Europe ☒Middle East	As Federal Research Institute for Animal Health in Germany the FLI the expertise of the FLI covers in addition to animal diseases and zoonoses the areas of animal welfare, animal nutrition and farm animal genetics. Collaboration with national and international partners to gain and share information are ongoing. The FLI together with Universities of Wageningen and Aarhus is appointed as European Reference Centre for Animal Welfare of Pigs.

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

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

Yes

Name of expert	Kind of consultancy	Subject

Prof. Mettenleiter	One Health High Level Expert Panel (OHHLEP) - Chair	Four partite Initiative of FAO, OIE, UNEP and WHO
Prof. Mettenleiter	OIE AD HOC GROUPs	Covid-19 at the Animal-Human Interface Covid-19 and Safe Trade in Animals and Animal Products
Prof. Mettenleiter; Prof. Beer	WHO-Working group:	Covid-19 at the Animal-Human Interface
Dr. Müller; Dr. Freuling	OIE AD HOC GROUP	OIE Terrestrial Code - Revision of the Chapter 8.14. (Infection with rabies virus) Evaluation of official dog rabies control programs for OIE endorsement
Dr. Müller; Dr. Freuling; Dr. Fahrion; Dr. Busch	United Against Rabies (UAR) Forum	Workstream leads including (Development of a template for national strategic plans; Constraints in dog rabies elimination; Revision of WHO recommendations on oral vaccination of dogs; Rapid diagnostic testing)
Prof. Harder	JOINT OIE-FAO SCIENTIFIC NETWORK ON ANIMAL INFLUENZA	OFFLU – Wildlife Group OFFLU Applied Epidemiology Working Group
Dr. Fast	TSE Strain Typing Expert Group (STEG)	Evaluation of any unusual results arising from TSE testing in small ruminants within Europe, particularly of those in which BSE cannot be excluded after primary discriminatory testing.

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

Yes
a) Technical visits: 3
b) Seminars: 5
c) Hands-on training courses: 0
d) Internships (>1 month): 2

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
a	COVID-19 high-throughput sequencing wet-lab training and One Health round table, Kumasi Centre for Collaborative Research in Tropical Medicine , 04.-15.09.2021	Ghana	5

a	Training on rabies diagnosis and oral vaccination of free-roaming dogs (baiting, evaluation of vaccination status, App based data capturing) 19./20. Oct. 2021	Namibia	15
a	Nigeria Adressing Corona through a One Health approach (NACOH), Laboratory training incl. establishing ELISA for anti-SARS-CoV-2 in animals, 29.11-10.12.2021	Nigeria	5
b	Online Seminar 'The Global Assault of Zoonotic Infections' in the frame of the European-African Partnership Research Projects LEARN and HENRI 03.-05.03.2021	Germany, Netherlands, Cameroon	60
b	Online workshop "ELISA and antigen expression" with South African students / phD students in the frame of the European-African Partnership Research Project LEARN, 11./12. May 2021	Germany, Netherlands, Cameroon	15
b	Online seminar „Library Preparation and Sequencing of Bacterial Genomes", 5. Oct. 2021	Ukraine	3
b	Online seminar on tick morphology, biology, ecology and vector competence in collaboration with the Ukrainian State Scientific and Research Institute of Laboratory Diagnostics and Veterinary and Sanitary Expertise (SSRILDVSE), 30. Nov. 2021	Ukraine	50
b	Online seminar on novel sequencing techniques (focus: hemorrhagic fever viruses) for partner institutions in Mauretania, Cameroon and Sierra Leone, 7. Dec. 2021	Mauretania, Cameroon, Sierra Leone	8
d	Nonhuman primate infection with Treponema pallidum in Ghana. PhD-Student, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. 16.10 -15.12.2021	Ghana	1
d	Molecular and serological analyses of ticks and serum samples from different animal species (mainly wildlife) from Spain for the presence of Crimean-Congo hemorrhagic fever virus genome and antibodies; Universidad de Córdoba, Animal Health Department, 15.09- 15.12.2021	Spain	1

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

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

Yes

National/International	Title of event	Co-organiser	Date (mm/yy)	Location	No. Participants

international	Annual United Against Rabies stakeholder meeting	OIE/WHO/FAO	11/21	virtual	100

ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 475
The FLI has published more than 450 peer-reviewed articles in 2021. Selected publications are listed here.
SARS-CoV-2: (27 Publications in 2021)
Michelitsch et al. (2021): SARS-CoV-2 in animals: From potential hosts to animal models. In: Margaret C. Kielian, Thomas C. Mettenleiter und Marilyn J. Roossinck (Hg.): Advances in Virus Research, Bd. 110: Elsevier (Advances in virus research, 110), S. 59–102.
Zhou et al. (2021) SARS-CoV-2 spike D614G change enhances replication and transmission (2021) SARS-CoV-2 spike D614G change enhances replication and transmission. In: Nature 592 (7852), S. 122–127. DOI: 10.1038/s41586-021-03361-1.
Ulrich et al. (2021) Enhanced fitness of SARS-CoV-2 variant of concern Alpha but not Beta. In: Nature. DOI: 10.1038/s41586-021-04342-0.
Hoffmann et al. (2021) CVnCoV and CV2CoV protect human ACE2 transgenic mice from ancestral B BavPat1 and emerging B.1.351 SARS-CoV-2. In: Nature Communications 12 (4048), S. 1–7. DOI: 10.1038/s41467-021-24339-7.
Michelitsch et al. (2021): The second wave of SARS-CoV-2 circulation - antibody detection in the domestic cat population in Germany. In: Viruses. DOI: 10.3390/v13061009

Cuadrado-Matías et.al. (2021) Red deer reveal spatial risks of Crimean- Congo haemorrhagic fever virus infection. Transbound Emerg Dis. doi: 10.1111/tbed.14385.
Allendorf et al. (2021): Assessing the occurrence of the novel zoonotic variegated squirrel bornavirus 1 in captive squirrels in Germany -A prevalence study. In: Zoonoses and public health 68 (2), S. 110–120. DOI: 10.1111/zph.12801.
Eisermann et al. (2021): Active Case Finding of Current Bornavirus Infections in Human Encephalitis Cases of Unknown Etiology, Germany, 2018–2020. In: Emerging infectious diseases 27 (5), S. 1371–1379. DOI: 10.3201/eid2705.204490.
Hofmann et al. (2021): Tula Virus as Causative Agent of Hantavirus Disease in Immunocompetent Person, Germany. In: Emerging infectious diseases 27 (4), S. 1232–1234. DOI: 10.3201/eid2704.203996.

b) International conferences: 10
Each year, FLI researchers present at numerous international conferences. Due to the Corona-pandemic many conferences were either postponed or organized as an online conference.

c) National conferences: 10
Each year, FLI researchers present at numerous national conferences. Due to the Corona-pandemic many conferences were either postponed or organized as an online conference.

d) Other
(Provide website address or link to appropriate information): 5
Website of the Friedrich-Loeffler-Institut, including general information and actual information on animal diseases (www.fli.de)
Twitter-Account of the Friedrich-Loeffler-Institut, including special information, press-releases and retweets of special interest. (@Loeffler_News)
Radar Bulletin Germany – it compiles and evaluates information on the global situation and on the spread of the most important animal diseases which are relevant for Germany and Switzerland. (https://www.fli.de/en/publications/radar-bulletin-germany/)
Rabies - Bulletin – Europe: Rabies Information System of the WHO (https://www.who-rabies-bulletin.org/)
German Research Platform for Zoonoses - an information and service network, funded by the Federal Ministry of

Education and Research (BMBF), for all working groups operating in Germany in the field of zoonoses research (net/Default.aspx?tabid=1275)

9. Additional comments regarding your report: