

OIE Collaborating Centres Reports Activities

Activities in 2021

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Title of collaborating centre:	ELISA and Molecular Techniques in Animal Disease Diagnosis
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Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Giovanni Cattoli, Head, Animal Production and Health Laboratory, Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture, International Atomic Energy Agency, Seibersdorf, Austria
Name of writer:	Giovanni Cattoli

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

Training, capacity building	
Title of activity	Scope
Distribution of laboratory PCR controls, reagents, and Standard Operating Procedures for capripox viruses, including Lumpy skin disease virus (LSDV), and PPR detection, to veterinary laboratories in Bhutan, Cambodia, Indonesia, Laos, Mongolia, and Sri Lanka Vietnam.	To strengthen veterinary laboratories' capacities and help countries facing the emergence of LSDV and the spread of PPR in Asia.
Technical assistance to member states in Asia (Mongolia, Nepal, Thailand, Vietnam) for the generation of whole-genome sequence data related to LSDV and African Swine Fever virus (ASFV)	To build veterinary laboratories' capacities and help countries facing the emergence of LSDV and ASFV in Asia.
Emergency support to the Dominican Republic for the emergence of ASFV (SOPs, PCR controls, and reagents)	Emergency response, laboratory preparedness
Distribution of laboratory PCR controls, reagents, genome sequencing, and Standard Operating Procedures for avian influenza viruses (AIV), ASFV, LSDV, and PPR detection, to veterinary laboratories in Botswana, Burkina Faso, Cameroon, Ethiopia, Ivory Coast, Lesotho, Morocco, Mozambique, Namibia, Nigeria, Senegal, Tanzania, Uganda, and Zambia	To strengthen veterinary laboratories' capacities and help countries facing the emergence of AIV and the spread of ASFV, LSDV, and PPRV in Africa.
Training Course on the Laboratory Diagnosis of ASFV for veterinary laboratories in Dominican Republic and the region.	Emergency training course for the national laboratories on techniques for early and rapid detection and characterization of the ASFV
Training Course for Veterinary Diagnostic Laboratories on Sequencing and Bioinformatics	To provide basic knowledge on next-generation sequencing (NGS) and NGS data analysis on the Linux interface. In addition, the participants received training on advanced concepts of the phylogenetic analysis of viruses
Transfer to member states veterinary laboratories of multiplex PCR-based assays for zoonotic pathogens causing abortion (Botswana, Indonesia, Lesotho, Senegal), for small ruminants' respiratory diseases (Indonesia, Mongolia), for pox-viruses (Indonesia, Thailand)	To strengthen veterinary laboratories' capacities in syndromic surveillance and differential diagnosis of transboundary animal and zoonotic diseases.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Molecular epidemiology and genome sequencing study - samples	173 new samples for molecular characterization and gene sequencing from laboratories in resource-limited settings (for ASFV, AIV, capripox, and LSDV, PPRV, PCV, RVFV)

Development of sequencing pipeline and related operating procedure for the whole genome sequence of Lumpy Skin Disease	To provide one SOP for the direct sequencing of the complete genome of capripox viruses from clinical samples
Molecular epidemiology and genome sequencing study - sequence analysis	278 sequences for ASFV, PCPV, ORF, AIV, LSDV, and PCV were analyzed and made publicly available on the genetic database (GenBank).
Evaluation of Commercially Available PCR-Based Detection Kits for African Swine Fever	To compare the sensitivity of commercial kits and PCR master-mix with the OIE recommended protocol (King et al. 2003). Comparison study was extended to include eight different products.
Development and evaluation of two LIPS-based serological assays for SARS-CoV2 antibodies detection in animal species.	Two novel assays were developed and tested on different animal species using field and experimental infections samples.
Design and preliminary evaluation of a multiplex serological assay for selected small ruminants' respiratory diseases	A multiplex assay designed to detect antibodies simultaneously to capripoxvirus, PPRV, and RVF is under evaluation.
PCR-based detection and molecular epidemiology of Porcine Circovirus in Africa.	To study the emergence, circulation, and evolution of PCV in Africa.
PCR-based detection and molecular epidemiology of Porcine Circovirus in Asia.	To study the emergence, circulation, and evolution of PCV in selected Asian countries. Evidence for co-infections with ASFV.
Sanger Sequencing Service for transboundary animal and zoonotic diseases	A standardized multi-step procedure for sequencing services through an external service provider; consists of instructions for sample preparation, evaluation and shipment, sequence assembly and sequence alignment, and development and interpretation of phylogenetic trees of pathogens. In 2021, 1939 samples were submitted from 14 Member State veterinary laboratories using this service.
Development of bioinformatics pipelines for the whole genome sequencing data analysis for selected pathogens and metagenomic data analysis	Seven bioinformatic pipelines developed for WGS of RNA viruses, LSDV and metagenomic analysis in clinical samples
Vaccines	
Title of activity	Scope
Immunomodulation Properties of Irradiated Lactobacilli	To understand (in-vitro) the immunomodulation properties of four strains of lactobacilli and the effects of heat- and gamma irradiation-treatment on their immunogenicity.
Development of in-vitro assays that measure vaccine immunogenicity in Avian splenocytes through the use of qPCR	To measure the expression of avian immune markers during animal trials and when carrying out in vitro assays using chicken splenocytes.
Evaluation of the protection efficacy of an irradiated Avian Influenza (H9N2) vaccine prototype in chickens.	Challenge experiments were undertaken to evaluate the in vivo immune response and protection in chickens of an irradiated vaccine candidate (intramuscular and mucosal applications).
Irradiation experiments on ASFV	To assess D10 Values of selected ASFV strains to determine optimal irradiation dose for inactivation and vaccine antigen candidates.

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
Distribution of controls and Standard Operating Procedures for ASFV, LSDV, PPRV detection	QC of PCR tests for Capripoxvirus detection and genotyping detection	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Production of reference positive and negative controls for serological and molecular assays (in collaboration with member states laboratories and reference centres)	Production of secondary, serological, and molecular standards for selected priority diseases (AI, ASF, Brucellosis, LSD, SPP, GTP, PPR, Rabies)	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Organization of inter-laboratory comparison for PPRV	38 laboratories in Africa, Asia, and Europe responded and accepted the participation in the ring trial for PPR virus and antibody detection	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Comparison of serological assays for PPR antibody detection in unusual hosts	A PPR positive and negative sera panel was tested with traditional (VNT, cELISA) and novel assays (PVNA, LIPS). Multicentric study.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
PPR Expert Group Workshop on the application of serological assays in unusual hosts, including wildlife	To review the data and current state of knowledge on PPR serological surveillance and to discuss appropriate testing protocols or algorithms	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> 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

OIE CC Diagnostic Test Validation Science in the Asia-Pacific Region CSIRO Australian Animal Health Laboratory	Australia	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Test validation, ring trial
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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
OIE RL for African Swine Fever, Universidad Complutense Madrid	Spain	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	ASF training, research
OIE RL for Avian influenza, FLI	Germany	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	avian influenza detection and typing
OIE RL for Equine Influenza, Irish Equine Centre	Ireland	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	Equine influenza standards, detection and typing
OIE RL for Avian influenza and Newcastle disease, IZSVE	Italy	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	avian influenza and Newcastle disease detection and typing
OIE RL for Contagious bovine pleuropneumonia, BNVL	Botswana	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Rapid laboratory diagnoses, quality control, ring trial
OIE RL for Brucellosis, Servicio Nacional de Sanidad y Calidad Agroalimentaria (SENASA)	Argentina	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Brucella reference material

OIE RL for PPR, CIRAD	France	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	PPRV Trainings, networking and laboratory activities
OIE RL for PPR, National Diagnostic Center for Exotic Animal Diseases	China	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	PPRV Trainings, networking
OIE RL for PPR, The Pirbright Institute	United Kingdom	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	PPRV research
OIE CC for Quality Control of Veterinary Vaccines, PANVAC	Ethiopia	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Trainings and workshops

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?

No

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: 0
- b) Seminars: 214
- c) Hands-on training courses: 23
- d) Internships (>1 month): 3

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

c	Training Course for Veterinary Diagnostic Laboratories on Sequencing and Bioinformatics	Senegal, Ethiopia, Botswana, Tunisia, Morocco, Thailand, Indonesia, Malaysia, Bangladesh.	18
c	Training Course on Laboratory Diagnosis of ASFV for veterinary laboratories in Dominican Republic and the region.	Dominican Republic	13
b	Training Course on the Laboratory Diagnosis of ASFV for veterinary laboratories	Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru, St. Vincent and The Grenadines, Uruguay, and Venezuela	214
c	LSD detection and differential diagnosis	Indonesia	10
d	Laboratory Database (iVetNet) viruses and test validation	Indonesia	1
d	Diagnostic and characterisation of zoonotic pathogens causing abortions in ruminants	Botswana	1
d	Veterinary immunological assays	Pakistan	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?

No

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: 25

Anahory, I.V., Franzo, G., Settypalli, T.B.K., Mapaco, L.P., Achá, S.J., Molini, U., Cattoli, G., Lamien, C.E., Dundon, W.G., Identification of porcine circovirus-3 in Mozambique. Vet Res Commun. Nov 8 (2021). DOI: 10.1007/s11259-021-09858-4.

Ankhanbaatar, U., Sainnokhoi, T., Settypalli, T.B.K., Datta, S., Gombo-Ochir, D., Khanui, B., Dorj, G., Basan, G., Cattoli, G., Dundon, W.G., Lamien, C., Isolation and Identification of a Highly Pathogenic Avian Influenza H5N6 Virus from Migratory Waterfowl in Western Mongolia. J Wildl Dis. Oct 26 (2021). DOI: 10.7589/JWD-D-21-00032.

Berguido, F.J., Burbelo, P.D., Bortolami, A., Bonfante, F., Wernike, K., Hoffmann, D., Balkema-Buschmann, A., Beer, M., Dundon, W.G., Lamien, C.E., Cattoli, G., Serological detection of SARS-CoV-2 antibodies in naturally-infected

- mink and other experimentally-infected animals. *Viruses* 13 1649 (2021). DOI: 10.3390/v13081649.
- Chibssa, T.R., Kangethe, R.T., Berguido, F.J., Settypalli, T.B.K., Liu, Y., Grabherr, R., Loitsch, A., Sassu, E.L., Pichler, R., Cattoli, G., Diallo, A., Wijewardana, V., Lamien, C.E., Innate Immune responses to wildtype and attenuated sheeppox virus mediated through RIG-1 sensing in PBMC in-vitro. *Frontiers in Immunology* 12 (2021). DOI: 10.3389/fimmu.2021.666543.
- Dundon WG, Settypalli TBK, Spiegel K, Steinrigl A, Revilla-Fernández S, Schmoll F, Naletoski I, Lamien CE, Cattoli G. Comparison of eleven in vitro diagnostic assays for the detection of SARS-CoV-2 RNA. *J Virol Methods*. 2021 Jun 1; 295:114200. doi: 10.1016/j.jviromet.2021.114200. Epub ahead of print.
- Dessalegn, B., Bitew, M., Asfaw, D., Khojaly, E., Ibrahim, S.M., Abayneh, T., Gelaye, E., Unger, H., Wijewardana, V., Gamma-Irradiated Fowl Cholera Mucosal Vaccine: Potential Vaccine Candidate for Safe and Effective Immunization of Chicken Against Fowl Cholera. *Frontiers in Immunology* 12 768820 (2021). DOI: 10.3389/fimmu.2021.768820.
- Dundon, W.G., Franzo, G., Settypalli, T.B.K., Dharmayanti, N.L.P.I., Ankanbaatar, U., Sendow, I., Ratnawati, A., Sainnokhoi, T., Molini, U., Cattoli, G., Lamien, C.E., Evidence of coinfection of pigs with African swine fever virus and porcine circovirus 2. *Archives of Virology* Nov 26 (2021). DOI: 10.1007/s00705-021-05312-7.
- Franzo, G., Settypalli, T.B.K., Agusi, E.R., Meseko, C., Minoungou, G., Ouoba, B.L., Habibata, Z.L., Wade, A., de Barros, J.L., Tshilenge, C.G., Gelaye, E., Yami, M., Gizaw, D., Chibssa, T.R., Anahory, I.V., Mapaco, L.P., Achá, S.J., Ijomanta J., Jambol, A.R., Adedeji, A.J., Luka, P.D., Shamaki, D., Diop, M., Bakhom, M.T., Lo, M.M., Chang'a, J.S., Magidanga, B., Mayenga, C., Ziba, M.W., Dautu, G., Masembe, C., Achenbach, J., Molini, U., Cattoli, G., Lamien, C.E., Dundon, W.G., Porcine circovirus-2 in Africa: Identification of continent-specific clusters and evidence of independent viral introductions from Europe, North America and Asia. *Transbound Emerg Dis*. Nov 23 (2021). DOI: 10.1111/tbed.14400.
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- Motamedi-Sedeh, F., Saboorzadeh, A., Khalili, I., Sharbatdaran, M., Wijewardana, V., Arbabi, A., Carboxymethyl chitosan bounded iron oxide nanoparticles and gamma-irradiated avian influenza subtype H9N2 vaccine to development of immunity on mouse and chicken. *Vet Med Sci*. Dec 8 (2021). DOI: 10.1002/vms3.680.
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- Tuppurainen, E., Dietze, K., Wolff, J., Bergmann, H., Beltran-Alcrudo, D., Fahrion, A., Lamien, C.E., Busch, F., Sauter-Louis, C., Conraths, F.J., De Clercq, K., Hoffmann, B., Knauf, S., Review: Vaccines and vaccination against lumpy skin disease. *Vaccines* 9 10 (2021). DOI:10.3390/vaccines9101136.
- Pawęska, J.T., Vuren, P.J. van, Msimang, V., Lô, M.M., Thiongane, Y., Mulumba-Mfumu, L.K., Mansoor, A., Fafetine, J.M., Magona, J.W., Boussini, H., Bażanow, B., Wilson, W.C., Pepin, M., Unger, H., Viljoen, G.J., LargeScale International Validation of an indirect ELISA based on recombinant nucleocapsid protein of Rift Valley fever virus for the detection of IgG antibody in domestic ruminants. *Viruses* 13 1651 (2021). DOI: 10.3390/v13081651.
- Ward, M.P., Tian, K., Nowotny, N., African Swine fever, the forgotten pandemic. *Transbound Emerg Dis* 68 2637–2639 (2021). DOI: 10.1111/tbed.14245.
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Viljoen, G.J., Unger, H., Wijewardana, V., Naletoski, I., "Novel developments and next-generation vaccines", Veterinary vaccines. Principles and applications (Metwally, S., Idrissi, A.E., Viljoen, G., Eds), John Wiley & Sons (2021) 119-134. DOI: 10.1002/9781119506287.ch10.

b) International conferences: 1

International Symposium on Sustainable Animal Production and Health – Current Status and Way Forward - 28th June-2nd July - IAEA HQ, Vienna - Austria

c) National conferences: 0

d) Other

(Provide website address or link to appropriate information): 0

9. Additional comments regarding your report:

In 2021, the activities of the reporting OIE CC have been affected by the COVID-19 pandemic. Particularly, capacity building activities and expert missions were negatively impacted.