

WOAH Collaborative Centre Reports Activities 2022

Activities in 2022

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Centre Information

Title of WOA Collaborating Centre	ELISA and Molecular Techniques in Animal Disease Diagnosis
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Name Director of Institute (Responsible Official):	Dongxin Feng, Joint FAO/IAEA Centre of Nuclear Techniques in Food and Agriculture, International Atomic Energy Agency, Vienna, Austria
Name (including Title and Position) of Head of the Collaborating Centre (WOAH 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 the writer:	Giovanni Cattoli

TOR1 AND 2: SERVICES PROVIDED

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

Training, capacity building	
Title of activity	Scope
	To build veterinary laboratories' capacities in limited resourced

practical training on Next Generation Sequencing and relevant bioinformatic tools	countries on bioinformatics applied to pathogens detection and characterization and give them access to NGS technology
Training, capacity building	
Title of activity	Scope
practical training on detection and differential diagnosis of PPR in small ruminants and other non-conventional hosts	To strengthen veterinary laboratories in Africa and Asia on early and rapid detection of PPR and its differential diagnosis
Training, capacity building	
Title of activity	Scope
practical training on African Swine Fever diagnosis	To strengthen veterinary laboratories in Europe on laboratory diagnosis and serological screening for ASFV
Training, capacity building	
Title of activity	Scope
Virtual Training on Serological and Molecular Techniques for Animal Disease	To build capacity for the field and laboratory diagnosis of LSDV, PPR and other TAD's in Pakistan
Training, capacity building	
Title of activity	Scope
Virtual Training courses on vaccine immunogenicity (LSDV)	To strengthen vaccine development and quality control for LSDV vaccines.
Training, capacity building	
Title of activity	Scope
Virtual training on Molecular epidemiology of PPRV and genome sequencing	To strengthen PPRV surveillance and control in India
Training, capacity building	
Title of activity	Scope
Provision of reagents and Distribution of Standard Operating Procedures for AIV	Capacity building and emergency response addressing national veterinary laboratories in Latin America on techniques for early

	and rapid detection and characterization of the AIV (H5 HPAI)
Training, capacity building	
Title of activity	Scope
Distribution of laboratory PCR controls, PCR and ELISA reagents, and Standard Operating Procedures for PPR and Capripox detection, to veterinary laboratories in Asia and Africa.	To support PPRV and Capripox early detection and surveillance in endemic and newly affected countries.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Molecular epidemiology and genome sequencing study - samples	343 new samples for molecular characterization and gene sequencing from laboratories in resource-limited settings (for ASFV, AIV, GTPV and LSDV, NDV, PPRV, PCV, RABV, RHDV, RVFV)
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Comparison of LIPS-based and ELISA serological assays for SARS-CoV2 antibodies detection in animal species	Two LIPS assays and 2 commercially available ELISA's for veterinary use have been evaluated and compared with the virus neutralization assay. LIPS assays were also tested against animal sera raised against distinct SARS-CoV2 variants.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Evaluation of freeze-dried PCR reagents for the detection of AIV / H5 and H9	To evaluate the performance of RT-PCR freeze-dried reagents and compare the results with those obtained using WOAH described PCR test for AIV.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Design and preliminary evaluation of multiplex PCR assays for selected zoonotic pathogens and animal species	Three family-based multiplex PCR-based assays were developed for the detection of zoonotic pathogens belonging to distinct virus families (Coronavirus, Flavivirus, Lyssavirus, Orthomyxovirus, Paramyxovirus).
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Development of a pan-Lyssaviruses LIPS serological assay	A species-independent serological assay to detect Lyssavirus antibodies.

Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Design and preliminary evaluation of one assay for detection of Lassa Fever virus antibodies	A species-independent serological assay to detect Lassa Fever virus antibodies.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Whole genome sequence for pathogens characterization	Three sample preparation and sequencing workflows were developed for the whole sequencing of RNA viruses by Ion S5 and Minion (Nanopore) and three Bioinformatic pipelines for whole genome assembly.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Identification of pathogens by metagenomics	Two workflows (DNA and RNA) and two data analysis pipelines were established for the metagenomics identification of pathogens, including zoonotic pathogens.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Transfer of LIPS serology for PPRV	The LIPS assay for the detection of PPRV antibodies in small ruminants and other non-conventional hosts transferred to the PPR WOAHA Reference Laboratory at the Pirbright Institute (UK)
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
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 2022, 1682 samples were submitted from 9 Member State veterinary laboratories using this service. The contribution of the sequencing service has been acknowledged in 13 scientific publications in peer-reviewed journals published by member states (2021/2022).
Vaccines	
Title of activity	Scope

Irradiated vaccines development	In vitro immune stimulation of animal PBMS with diverse strains of irradiated lactobacilli potentially used for adjuvant or para-probiotics
Vaccines	
Title of activity	Scope
Irradiated vaccines development	Irradiated vaccine candidate against colibacillosis in chickens
Vaccines	
Title of activity	Scope
Irradiated vaccines development	Effect of irradiation on the Trypanosoma evansi transcriptome to identify molecular changes and gene transcripts that may be involved in establishing disease in mice

TOR3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main focus area for which you were designated

Proposal title	Scope/Content	Applicable area
Organization of inter-laboratory comparison for PPRV	31 laboratories in Africa, Asia, and Europe participated to the ring trial for PPR virus and antibody detection	Laboratory expertise
Organization of inter-laboratory comparison for LSDV	8 laboratories in Asia participated to the ring trial for LSD virus detection by molecular methods.	Laboratory expertise
Test quality control	Distribution of controls and Standard Operating Procedures for Capripox, PPRV and CCPV detection	Laboratory expertise

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

Yes

		Region of	
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Name of OIE CC/RL/other organisation(s)	Location	networking Centre	Purpose
WOAH CC Diagnostic Test Validation Science in the Asia-Pacific Region CSIRO Australian Centre for Disease Preparedness (ACDP)	Australia	Asia and Pasific	Laboratory tests validation
Viral Genomics and Bioinformatics University of Glasgow Centre for Virus Research (CVR), Glasgow	United Kingdom	Europe	Bioinformatics and genome analysis

TOR4 AND 5: NETWORKING AND COLLABORATION

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

TOR6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOAHO?

Yes

NAME OF EXPERT	KIND OF CONSULTANCY	SUBJECT
Charles E. Lamien	capacity building - online	Establishment of an Open Access Information Sharing Platform for the dissemination African swine fever epidemiological and information. July 2022

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

Yes

Provide access to genome sequencing technology by facilitating access to- and support for- sequencing service providers as well as by sequencing samples upon request of member states.

Provide technical assistance and troubleshooting for ELISA and molecular techniques to national veterinary diagnostic laboratories.

Coordinate and support activities of a global network of national diagnostic veterinary laboratories.

Facilitate access to reference material, maintenance and calibration of laboratory equipment, and external quality assurance for laboratories operating in limited resourced settings.

Beneficiaries: WOAHO, FAO and IAEA member states.

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOAHO, to personnel from WOAHO Members?

Yes

a) Technical visit : 2

b) Seminars : 496

c) Hands-on training courses: 115

d) Internships (>1 month) : 5

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	Provided training on Next Generation Sequencing and relevant bioinformatic tools to identify pathogens causing transboundary animal and zoonotic diseases	Africa and Asia regions	30
c	Provided training on detection and differential diagnosis of PPR in small ruminants and other non-conventional hosts	Africa and Asia regions	29
c	Provided training on detection and characterization of Capripox and PPRV	Albania, Azerbaijan, Bosnia Hezegovina, Bulgaria, Georgia, Greece, Hungary, Latvia, Lithuania, Malta, Montenegro, N.Macedonia, Portugal, Romania, Russia, Serbia, Slovakia, Turkey	19
c	Provided training on Next Generation Sequencing (Illumina platform)	Albania, Azerbaijan, Bosnia Hezegovina, Croatia, Cyprus, Georgia, Greece, Hungary, Latvia, Lithuania, Malta, Montenegro, Portugal, Romania, Serbia, Slovakia, Turkey, Uzbekistan	18
c	Provided training on African Swine Fever Laboratory Diagnosis and Serological Screening	Bosnia and Herzegovina	19
a	Technical visit on molecular assays validation, sample preparation and genome sequencing	Myanmar	2
d	Provided training on Next Generation Sequencing (IonTorrent platform) – from sample preparation to data analysis	Indonesia, Senegal, Tunisia	3
d	Irradiated microorganisms and immune response	China	2

b	Virtual Training on Serological and Molecular Techniques for Animal Disease Diagnosis.	Pakistan	214
b	Virtual Training courses on vaccine immunogenicity (LSDV)	Turkey	32
b	Molecular epidemiology of PPRV and genome sequencing". Virtual Workshop of Diagnosis of PPR. Indian Veterinary Association/FAO	India	250

TOR8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOA?H?

Yes

NATIONAL/INTERNATIONAL	TITLE OF EVENT	CO-ORGANISER	DATE (MM/YY)	LOCATION	NO. PARTICIPANTS
International	High Pathogenicity Avian Influenza - Vaccination Strategies to prevent and control HPAI: Removing unnecessary barriers for usage	IABS	2022-10-25	WOAH HQ	200

TOR9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOA?H that may be useful to Members of WOA?H

a) Articles published in peer-reviewed journals:

15

1. Pikalo J, Porfiri L, Akimkin V, Roszyk H, Pannhorst K, Kangethe RT, Wijewardana V, Sehl-Ewert J, Beer M, Cattoli G, Blome S. Vaccination With a Gamma Irradiation-Inactivated African Swine Fever Virus Is Safe But Does Not Protect Against a Challenge. *Front Immunol.* 2022 Apr 26;13:832264. doi: 10.3389/fimmu.2022.832264.

2. Molini U, Curini V, Jacobs E, Tongo E, Berjaoui S, Hemberger MY, Puglia I, Jago M, Khaiseb S, Cattoli G, Dundon WG, Lorusso A, Di Giallonardo F. First influenza D virus full-genome sequence retrieved from livestock in Namibia, Africa. *Acta Trop.* 2022 May 7;232:106482. doi: 10.1016/j.actatropica.2022.106482. Epub ahead of print.

3. Bagheri S, Paudel S, Wijewardana V, Kangethe RT, Cattoli G, Hess M, Liebhart D, Mitra T. Production of interferon gamma and interleukin 17A in chicken T-cell subpopulations hallmarks the stimulation with live, irradiated and killed avian pathogenic *Escherichia coli*. *Dev Comp Immunol.* 2022 Apr 4;133:104408. doi: 10.1016/j.dci.2022.104408. Epub ahead of print.

4. Koirala P, Meki IK, Maharjan M, Settypalli BK, Manandhar S, Yadav SK, Cattoli G, Lamien CE. Molecular Characterization of the 2020 Outbreak of Lumpy Skin Disease in Nepal. *Microorganisms.* 2022 Feb 28;10(3):539. doi:10.3390/microorganisms10030539.

5. Molini U, Mutjavikua V, DE Villiers M, DE Villiers L, Samkange A, Coetzee LM, Khaiseb S, Cattoli G, Dundon WG. Molecular characterization of avipoxviruses circulating in Windhoek district, Namibia 2021. *J Vet Med Sci.* 2022 Mar 21. doi:10.1292/jvms.22-0017. Epub ahead of print.

6. Molini U, Coetzee LM, Van Zyl L, Khaiseb S, Cattoli G, Dundon WG, Franzo G. Molecular Detection and Genetic Characterization of Porcine Circovirus 2 (PCV-2) in Black-Backed Jackal (*Lupulella mesomelas*) in Namibia. *Animals (Basel)*. 2022 Mar 1;12(5):620. doi: 10.3390/ani12050620.
7. Auer A, Settypalli TBK, Mouille B, Angot A, De Battisti C, Lamien CE, Cattoli G. Comparison of the sensitivity, specificity, correlation and inter-assay agreement of eight diagnostic in vitro assays for the detection of African swine fever virus. *Transbound Emerg Dis*. 2022 Feb 21. doi: 10.1111/tbed.14491. Epub ahead of print.
8. Makalo MRJ, Dundon WG, Settypalli TBK, Datta S, Lamien CE, Cattoli G, Phalatsi MS, Lepheana RJ, Matlali M, Mahloane RG, Molomo M, Mphaka PC. Highly pathogenic avian influenza (A/H5N1) virus outbreaks in Lesotho, May 2021. *Emerg Microbes Infect*. 2022 Dec;11(1):757-760. doi: 10.1080/22221751.2022.2043729.
9. Sidi M, Zerbo HL, Ouoba BL, Settypalli TBK, Bazimo G, Ouandaogo HS, Sie BN, Guy IS, Adama DD, Savadogo J, Kabore-Ouedraogo A, Kindo MG, Achenbach JE, Cattoli G, Lamien CE. Molecular characterization of African swine fever viruses from Burkina Faso, 2018. *BMC Vet Res*. 2022 Feb 12;18(1):69. doi:10.1186/s12917-022-03166-y.
10. Molini U, Franzo G, Settypalli TBK, Hemberger MY, Khaiseb S, Cattoli G, Dundon WG, Lamien CE. Viral Co-Infections of Warthogs in Namibia with African Swine Fever Virus and Porcine Parvovirus 1. *Animals (Basel)*. 2022 Jun 30;12(13):1697. doi: 10.3390/ani12131697.
11. Franzo G, Dundon WG, De Villiers M, De Villiers L, Coetzee LM, Khaiseb S, Cattoli G, Molini U. Phylodynamic and phylogeographic reconstruction of beak and feather disease virus epidemiology and its implications for the international exotic bird trade. *Transbound Emerg Dis*. 2022 Jun 13. doi: 10.1111/tbed.14618.
12. Bortolami A, Mazzetto E, Kangethe RT, Wijewardana V, Barbato M, Porfiri L, Maniero S, Mazzacan E, Budai J, Marciano S, Panzarin V, Terregino C, Bonfante F, Cattoli G. Protective Efficacy of H9N2 Avian Influenza Vaccines Inactivated by Ionizing Radiation Methods Administered by the Parenteral or Mucosal Routes. *Front Vet Sci*. 2022 Jul 11;9:916108. doi: 10.3389/fvets.2022.916108.
13. Luka PD, Adedeji AJ, Jambol AR, Ifende IV, Luka HG, Choji ND, Weka R, Settypalli TBK, Achenbach JE, Cattoli G, Lamien CE, Molini U, Franzo G, Dundon WG. Coinfections of African swine fever virus, porcine circovirus 2 and 3, and porcine parvovirus 1 in swine in Nigeria. *Arch Virol*. 2022 Sep 22. doi:10.1007/s00705-022-05593-6.
14. Berguido FJ, Gelaye E, Liu Y, Davaasuren B, Krstevski K, Djadjovski I, Ivanova E, Goujgoulova G, Loitsch A, Tuppurainen E, Chibssa TR, Caufour P, Samojlović M, Lazić S, Petrović T, Vidanović D, Bertagnoli S, Grabherr R, Diallo A, Cattoli G, Lamien CE. Development and Optimization of Indirect ELISAs for the Detection of Anti-Capripoxvirus Antibodies in Cattle, Sheep, and Goat Sera. *Microorganisms*. 2022 Sep 30;10(10):1956. doi: 10.3390/microorganisms10101956.
15. Molini U, De Villiers M, De Villiers L, Coetzee LM, Hoebes E, Khaiseb S, Cattoli G, Dundon WG, Franzo G. Investigation and sequence analysis of psittacine beak and feather disease virus and avian polyomavirus from companion birds in Windhoek, Namibia. *Acta Trop*. 2022 Nov 11:106739. doi:10.1016/j.actatropica.2022.106739.

b) International conferences:

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1. PPR Global Research and Expertise Network organized by FAO and WOA in France. 7-9 December 2022
2. "A comparison of available serological assays for detecting PPRV antibodies in wildlife". 2nd annual workshop (virtual) of the WOA Reference Laboratory Network for PPR, on the 1 December, 2022.
3. "Comparison of a fourplex HRM and Taqman qPCR assays for the detection of *Brucella* spp. and *Coxiella burnetii* in ruminants abortion cases from Botswana" Brucellosis International Research Conference. Teramo (Italy) – 16-19 September 2022.
4. Establishing a National Certified Pipeline to Produce Aquaculture Vaccines by Irradiation. (also attended by WOA) - November 9th, 2022
5. 'The evaluation of five serological assays in determining seroconversion in typical and atypical host species of PPR'. 13th International Conference on Goats – Hungary, 19-22 September 2022
6. Current and Future Challenges in Veterinary Virus Genomics – Pirbright, UK. 21-22 June 2022

c) National conferences:

d) Other (Provide website address or link to appropriate information):

11. What have you done in the past year to advance your area of focus, e.g. updated technology?

Progress in advanced and long reads genome sequencing technology and related bioinformatic applications.

Progress in irradiation technology for pathogens inactivation and vaccines development.

12. Additional comments regarding your report: