

OIE Collaborating Centres Reports Activities

Activities in 2018

This report has been submitted : 2019-01-17 14:57:42

Title of collaborating centre:	New and Emerging Diseases
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Name of writer:	Dr. Sam McCullough Deputy Director, AAHL

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
OIE NIAH Twinning Project	A partnership with NIAH Thailand to enhance and deliver emerging infectious disease (EID) preparedness in the ASEAN Region for potential public health and food security threats arising from animal populations. The project is designed to enhance capability in the structured investigation of new and emerging diseases and zoonotic disease outbreaks including technology transfer with supporting quality assurance for known dangerous zoonoses and the development of systems for ongoing consultation between NIAH and AAHL.
OIE RAHO6 Twinning Project	Provision of technical support to the Regional Animal Health Office No. 6 (RAHO-6) Laboratory, Ho Chi Minh City, Vietnam under the OIE supported twinning project to enhance diagnosis and characterization of emerging diseases (EID) of pigs in the South east Asian region. AAHL is technically supporting RAHO-6 under an OIE twinning project that will conclude in December 2019. Thereafter RAHO-6 will make an application to the OIE to become a Reference Laboratory for swine TADs.
Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Northern Australia Surveillance Strategy	<p>Testing was conducted on surveillance samples from the Australian mainland, , Torres Strait Islands, Papua New Guinea and Timor-Leste for target diseases – Aujeszky's, Avian Influenza, Bluetongue, Classical Swine Fever, African Swine Fever, Ehrlichia, Foot-and- mouth disease, Infectious Bursal Disease, Japanese encephalitis, Newcastle Disease, Nipah, Porcine Reproductive and Respiratory Syndrome, Rabies, Surra, Brucella, Avian Metapneumovirus and Transmissible Gastroenteritis.</p> <p>Samples were submitted from pigs, cattle, water buffmoalo, sheep, goats, poultry, wild birds and dogs</p>
Training, capacity building	
Title of activity	Scope

Laboratory Capacity Building in regional countries	AAHL has an extensive program of capacity building with Institutions in Southeast Asia and South Asia. See separate report of the OIE Collaborating Centre for Laboratory Capacity Building.
Regional PT provision for FAO, OIE and OFFLU programs	To develop and distribute Proficiency Testing panels to assess the capability of national and regional laboratories in the to detect and characterise virus isolates of key targeted emergency animal health diseases
Zoonoses	
Title of activity	Scope
Diagnostic preparedness for emerging zoonotic avian influenza strains	Through the OFFLU network AAHL continued to produce and distribute evaluated avian influenza diagnostics reagents to national laboratories in the region for sensitivity and specificity of testing for H7N9, H5-HPAI and HxNx surveillance, infections and participated in validation of selected tests for the purposes of diagnosis and surveillance in at risk regional countries and supplied quality assured reagents to national laboratories in the region, organized PT panels and conducted back-stopping missions. The New H5N6 and H5N8 HPAI strains (clade 2.3.4.4) were isolated from specimens from several Southeast Asia countries; these viruses were characterized and diagnostic reagents prepared and evaluated
Mechanisms of neuro-invasion by henipaviruses	Studies conducted investigating mechanisms of neuro-invasion of Hendra and Nipah viruses, aiming to develop suitable therapeutics to prevent and treat
Mosquito immune response to arboviruses	RNA-Seq analysis of Aedes albopictus mosquito in response to chikungunya virus infection
Development of the "Smart mosquito trap"	In collaboration with other units in CSIRO and Deakin University, a Smart mosquito trap is being designed for surveillance work.
Mosquito genome editing technology	Establishment of mosquito genome editing technology, using CRISPR-Cas9, is being undertaken to determine whether vector competence of mosquitoes can be manipulated by genomic modifications.
Linking mosquito behaviour and their neurophysiology	In collaboration with Deakin University, studies are being performed to link mosquito behavior and their neurophysiology. The effect of viral infection on neurophysiology is currently being assessed.
Wildlife	
Title of activity	Scope
Monitoring of avian influenza viruses in Australia avifauna	AAHL functions as the national reference laboratory for the characterization of H5 and H7 avian influenza viruses detected in Australian wild birds by surveillance, and tests specimens from unexplained mortalities in wild birds for AI infection. AAHL also performs monitoring and characterisation of non-H5/H7 LPAI subtypes from the national avifauna surveillance program.

Avian diseases	
Title of activity	Scope
Pathogenesis studies of emerging avian influenza viruses (ongoing)	Challenge models for H5N1 and H5Nx HPAI virus infection in chickens, ducks, ferrets and mice are maintained for use in pathogenesis studies.
Genotyping of Australian avian influenza A viruses	Whole genome sequencing using NGS and genome wide phylogenetic analysis of avian influenza A viruses detected in wild bird samples in Australia.
Investigations into the molecular basis of pathogenicity of Newcastle disease viruses	Experimental inoculation of chickens and whole genome sequence analysis using virulent Australian Newcastle disease viruses.
Genotyping of Australian wild bird Newcastle disease viruses	Whole genome sequencing and phylogenetic analysis of Newcastle disease viruses from wild birds in Australia. For the first time, APMV-1 surveillance has been incorporated in the 2017 Australian Wild Bird surveillance program.
Investigating novel avian avulaviruses isolated from Antarctic penguins	In collaboration with the WHO Collaborating Centre for Reference and Research on Influenza, Melbourne, experimental studies on the pathogenicity and antigenicity of novel avian avulaviruses was undertaken. This work has been submitted for publication.
Surveillance and pathotyping of Australian IBDV	Monitor Australian IBDV to confirm that endemic strains remain genetically distinct from overseas strains and do not cause mortality. In addition, prove that Australia remains free of IBDV.
Aquatic animal diseases	
Title of activity	Scope
Comparative pathogenicity of exotic AHPND and the presumptive bacterial hepatopancreatitis detected in farmed <i>Penaeus monodon</i>	Studies to determine the pathogenicity of AHPND-causing bacteria in giant tiger prawns, <i>Penaeus monodon</i> , and banana prawns, <i>Fenneropenaeus merguensis</i> .
Determining the susceptibility of Australian <i>Penaeus monodon</i> and <i>P. merguensis</i> to newly identified enzootic (YHV7) and exotic (YHV8 and YHV10) Yellow head virus (YHV) genotypes.	Studies to determine the pathogenicity of newly-detected yellow head complex viruses to giant tiger prawns, <i>Penaeus monodon</i> , and banana prawns, <i>Fenneropenaeus merguensis</i> .
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
The IVM Online system, for molecular surveillance information management.	AAHL provides technical assistance to a USAID (FAO) supported project fostering the development of a molecular surveillance information management system, "IVM Online", to detect and monitor the development of variants of the H5N1 HPAI virus. The IVM Online is an advanced national data management and analysis platform that was formally launched in Indonesia during 2015, with a phase of enhancements during 2017.
Development of novel cell lines for propagating African swine fever virus	In collaboration with researchers at the Centro de Investigaciones Biológicas, CIB-CSIC Madrid and the Canadian Food Inspection Agency to use novel molecular tools to generate and characterise gene knock-outs in porcine cell lines that lead to enhanced virus replication. The cells produced will have potential application to both laboratory diagnosis and vaccine production.

Investigating host responses in porcine cells and pigs infected with African swine fever virus	In collaboration with Kansas State University and the Lawrence Livermore National Laboratory, USA, this project has involved the mRNA profiling of primary and continuous cells infected with different ASF virus strains, in order to identify important host genes and pathways involved in responding to virus infection. We have also performed mRNA sequencing and preliminary analysis of blood from pigs infected with moderately virulent ASFV. In collaboration with CSIRO scientists external to AAHL, pilot studies have been undertaken towards investigating the proteomic and metabolomics changes that occur in pigs following infection with highly virulent ASFV.
Development of a regional strategy for bioinformatics to support existing prevention and control strategies on emerging pandemic threat from animal and zoonotic diseases within the region	To develop and improve national and regional bioinformatics capacities to ensure the generation of high-quality sequence data, to strengthen national and regional bioinformatics capacities to analyze sequence and associated epidemiological data, to facilitate data and information sharing at the regional level, and to improve the interpretation and communication of results to guide policy making. To contribute to the development of pilot bioinformatics training modules that align with a regional strategy for bioinformatics to support existing prevention and control strategies on emerging pandemic threats from animal and zoonotic diseases within the Asia-Pacific region.
Developing and refining animal models for new and emerging high consequence pathogens	Assessing the use of real-time temperature chips for external monitoring of fever responses in virus challenge studies
Vaccines	
Title of activity	Scope
Vaccine efficacy studies against emerging FMD virus strains	<p>Investigated potential efficacy of available FMD vaccines against emerging strains of the FMDV using in vitro antigen matching tests (r1-values), in collaboration with the OIE South East Asia Regional Reference Laboratory in Thailand and RAHO-6 in Vietnam. It was shown that the viruses in South East Asia are constantly mutating and that the r1-values against the serotype A vaccine strains vary between the different years (may change from poor match to good match, or vice versa). The current commercial vaccines such as A/MAY/97 and A22/IRQ should provide protection when used as high potency vaccines. For serotype O the vaccine strain O3039 seems to be a good match and should be protective, also against the new O/Ind/2001 lineage, whilst O1 Manisa had only low r1 values to circulating O strains in SEA. The Thailand vaccine strains are well matched.</p> <p>Animal challenge trials evaluating the performance of vaccines included in most vaccine banks (serotypes O and A) that are circulating in Pool 1 (South East Asia), Pool 2 (South Asia) and Pool 3 (Middle East) indicated that high potency vaccines (>6PD50) will provide some protection against clinical disease, even when in vitro studies (r1-values) are low. Cattle were protected against challenge with the A/Asia/G-VII (G-VII lineage) virus with monovalent A/May/97 vaccine, despite a low r-value. A small trial comparing A/May/87 and A22/IRQ indicated that the latter is less protective, even at high antigen payloads.</p>
Tools to assist in outbreak control	An integrated web-based system, SPREAD (System for Preparedness & Response to Emergency Animal Diseases) to enable the visualisation of the spatio-temporal course of an FMD epidemic is in development. The application will have programs and use data enabling high resolution (i.e. farm-to farm scale) spatio-temporal wind dispersion as well as bioinformatics pipelines for the simultaneous genotyping and annotation of FMDV WGS sequence data to allow forensic tracing of viruses between premises.

Evaluations of Ebolavirus and other Filovirus vaccines in a Novel Ferret Model	Studies conducted assessing the ferret model as suitable for vaccine testing model for licensing of human vaccines against Ebola and Sudan viruses.
Porcine Nipah virus vaccine development	In collaboration with partners, conducting Nipah virus challenge studies in pigs to assess vaccine efficacy
Vaccine development	In collaboration in various partners, vaccine development activities are ongoing against a range of recently emerged pathogens

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
OIE ad hoc Group on the OIE Manual of Diagnostic Tests for Aquatic Animals	Review specific issues in the Aquatic Manual to improve consistency among chapters and improve the quality and completeness of information	<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
Global Foot-and-Mouth Disease Research Alliance (GRFA)	A global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	A coordinated global alliance of scientists producing evidence and innovation that enables the progressive control and eradication of FMD

Global African Swine Fever Disease Research Alliance	A Global Network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	To establish and sustain global research partnerships that will generate scientific knowledge and tools to contribute to the successful prevention, control and where feasible eradication of African Swine Fever (ASF).
EVAg	A Global Network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	A coordinated global network that mobilises expertise in virology to amplify, characterize, standardise, authenticate distribute, track, collect viruses and derived products
VetBioNet	A Global Network	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	The project forms a network of facilities researching animal diseases (including diseases which can spread to humans) in secure facilities. It will develop new technologies for this which go considerably beyond the current state of the art as well as activities such as standardization of protocols and best practices as well as connecting with similar institutes outside Europe. New tools will be developed for remote monitoring of the animals' health and welfare.
Biosafety Level 4 Zoonotic Laboratory Network (BSL4ZNet)	A Global Network	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	<p>BSL4ZNet is coordinating efforts to establish and sustain a BSL4 trusted partnership Network among Canada, The United States of America, Australia, the United Kingdom and Germany, in order to strengthen coordination, improve knowledge sharing and leverage integrated capacity for diagnostics, research and training.</p> <p>BSL4ZNet will focus on five priority areas: institutional cooperation, scientific excellence, world-class personnel, knowledge sharing and international response.</p>
OFFLU Network and WHO Global Influenza Program	Global	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Participate in and coordinate scientific and technical studies in zoonotic influenza to develop new diagnostic assays in animals and humans and inform surveillance strategies for pandemic preparedness.

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
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OIE Aquatic Animal Health Standards Commission	Global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Collaboration to ensure the Aquatic Animal Health Code (the Aquatic Code) and Manual of Diagnostic Tests for Aquatic Animals (the Aquatic Manual) reflect current scientific information
OFFLU	Global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Coordination of the science underpinning the management and control of influenza in animals.
OIE ad hoc Group on susceptibility of fish species to infection with OIE listed diseases	Global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Coordination of the science underpinning the management and control of OIE-listed diseases of fish species
WHO	Global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Tripartite Zoonoses Guide coordination investigation and response working group
WHO	Global network	<input checked="" type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input checked="" type="checkbox"/> Middle East	Working group on Molecular Detection, Subtyping and Characterisation of Influenza Viruses

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
Dr Nick Moody	Invited Participant	OIE Aquatic Animal Health Standards Commission
Dr Kim Halpin	Invited Participant	Nipah virus as part of the WHO's research and Development roadmaps process for priority diseases.
Dr Mark Crane	Invited Participant	Fourth meeting of the OIE ad hoc group on Susceptibility of fish species to infection with OIE listed diseases.

Dr Debbie Eagles	Speaker	Regional Workshop on Vector Borne Diseases in the Asia-Pacific region.
Dr John Bingham	Invited Participant	2018 launching Meeting of the OIE Twinning Project for Rabies between Anses-Nancy and AHRI
Dr Mark Crane	Invited Participant	OIE ad hoc group on susceptibility of fish species to infection with OIE listed diseases
Dr Nick Moody	Invited Participant	OIE Regional Expert Consultation Meeting on Aquatic Animal Diseases Diagnosis and Control
Dr Frank Wong	Member of the OFFLU Swine Influenza Group	WHO consultation for the composition of Influenza Virus vaccine, the work of the OFFLU network, various meetings and consultations
Dr John Allen, Dr Jianning Wang, Dr Anthony Keyburn, Dr Kim Halpin	Invited Participants	Various meetings and consultations as part of the OIE Twinning Project with NIAH Thailand and RAHO-6 Vietnam.
Dr Nagendra Singanallur	Meeting Participant	24th OIE Sub regional Representation for South Asia Sub-Commission meeting - FMD Exclusion testing and LEADDR network activities for FMD
Dr Wilna Vosloo	Meeting Participant	OIE ad hoc group on evaluation of FMD status of members
Dr Wilna Vosloo	Invited Participant	Mission to monitor the progress of an endorsed official control programme for FMD of an OIE member state

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: 227
- b) Seminars: 1040
- c) Hands-on training courses: 250
- d) Internships (>1 month): 0

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	Backstopping mission at the National Centre for Animal Health as part of the Technical Backstopping Missions to Participating Laboratories in Asia LoA	Bhutan	6

A	AMR method comparison project under the OIE Twinning project	Thailand	4
A	NGS development component of the OIE Twinning project for new emerging diseases	Thailand	4
A	RAHO6 as part of the newly approved OIE Twinning project	Vietnam	10
A	SIMA-Austral Collaborative Project (WP4) to meet with Sernapesca colleagues and asses the competence of the commercial testing laboratories	Chile	30
C	IVM Network meeting and training as part of FAO IVM LOA 9	Indonesia	25
C	Network positive control standarised material workshop as part of FAO IVM LOA 9	Japan	30
B	10th International Symposium on Avian Influenza	UK	100
B	Scientific programme committee for the 10th International Symposium for Avian Influenza	UK	20
A	Serology test and PCR Newcastle Disease	Indonesia	14
C	Diagnostic test validation workshop as part of the OIE Twinning project	Vietnam	40
A	AMR project as part of the OIE Twinning project	Bhutan	4
B	Symposium on Prevention and Control of Foot and Mouth Disease and Avian Influenza meeting	Republic of Korea	150
C	Molecular testing for aquatic animal disease agents	Thailand	30
A	National Proficiency Test on Avian Influenza serology test (AI)	Japan	5
B	Recent advances in Emergency Animal Disease Symposium 2018	Australia	110
B	Early Detection of Transboundary Animal Diseases	Various	40
A	Backstopping mission at the National Institute of Animal Health	Japan	10
A	Backstopping mission at the Mongolia State Central Veterinary Laboratory (SCVL)	Mongolia	10
B	8th International Symposium on Aquatic Animal Health (ISAAH)	Canada	400

B	Emergency African Swine Fever (ASF) Countermeasure Workshop	Thailand	70
A	Backstopping mission at the Veterinary Laboratory Services Unit, Brunei Agriculture Research Centre	Brunei	10
A	Backstopping mission at the National Centre for Animal Health	Bhutan	10
B	10th National Conference on Veterinary Diagnosis	Brazil	150
C	Animal Disease Investigation courses	Thailand/Bhutan	85
A	SIMA-Austral Collaborative Project (WP4)	Chile	30
C	Provide technical support for the implementation of the National Proficiency Test on AI serology test	Japan	5
A	Backstopping mission at the Veterinary Research Institute	Sri Lanka	10
C	Balivet workshop - emerging and re-emerging animal diseases	Indonesia	35
A	Final influenza virus monitoring (IVM) Network Meeting	Indonesia	40

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: 30

1 Artois, Jean; Blasdel, Kim; Duong, Veasna; Philippe, Buchy; Hul, Vibol; Morand, Serge; et al. Effects of mammarenavirus infection (Wēnzhōu virus) on the morphology of *Rattus exulans*. *Infection, Genetics and Evolution*. 2018; 63:404-409.

2 Baker, Michelle. Tools to study pathogen-host interactions in bats. *Virus Research*. 2018; 248:5-12. <https://doi.org/10.1016/j.virusres.2018.02.013>

3 Banerjee, A.; Misra, V.; Schountz, T.; Baker, Michelle. Tools to study pathogen-host interactions in wildlife: Dissecting bats as viral reservoirs. *Virus Research*. 2018; 248:5-12. <https://doi.org/10.1016/j.virusres.2018.02.013>

- 4 Barr, Jenn; Todd, Shawn; Cramer, Gary; Foord, Adam; Marsh, Glenn; Frazer, Leah; et al. Animal infection studies of two recently discovered African bat paramyxoviruses, Achimota 1 and Achimota 2. *Scientific Reports*. 2018; 8:Article no. 12744. <https://doi.org/10.1038/s41598-018-31193-z>
- 5 Berto, Alessandro; Anh, P.H; Carrique-Mas, J.J; Simmonds, P; Van Cuong, N; Tue, N.T.; et al. Detection of potentially novel paramyxovirus and coronavirus viral RNA in bats and rats in the Mekong Delta region of southern Viet Nam. *Zoonoses Public Health*. 2018; 65(1):30-42. <https://doi.org/10.1111/zph.12362>
- 6 Blasdell, Kim; Walker, Peter. Taxonomy of the order Mononegavirales: update 2018. *Archives of Virology*. 2018; 163(8):2283-2294.
- 7 Certoma, Andrea; Lunt, Ross; Vosloo, Wilna; Smith, Ina; Colling, Axel; Williams, David; et al. Assessment of a rabies virus rapid diagnostic test for the detection of Australian bat lyssavirus. *Tropical Medicine and Infectious Disease*. 2018; 3(4 NA):E109. <https://doi.org/10.3390/tropicalmed3040109>
- 8 Colling, Axel; Lunt, Ross; Bergfeld, Jemma; McNabb, Leanne; Newberry, Kim; Juzva, Susan; et al. A network approach for provisional assay recognition of a Hendra virus antibody ELISA – test validation with low sample numbers from infected horses. *Journal of Veterinary Diagnostic Investigations*. 2018; 30(3):362-369. <https://doi.org/10.1177/1040638718760102>
- 9 Gaburro, Julie; Bhatti, Asim; Harper, Jenni; Jeanne, Isabelle; Dearnley, Megan; Green, Diane; et al. Neurotropism and behavioral changes associated with Zika infection in the vector *Aedes aegypti*. *Emerging Microbes and Infections*. 2018; 7(1):Article no. 68. <https://doi.org/10.1038/s41426-018-0069-2>
- 10 Gaburro, Julie; Bhatti, Asim; Sundaramoorthy, Vinod; Dearnley, Megan; Green, Diane; Nahavandi, Saeid; et al. Zika virus-induced hyper excitation precedes death of mouse primary neuron. *Virology Journal*. 2018; 15:Article no 79. <https://doi.org/10.1186/s12985-018-0989-4>
- 11 Gaburro, Julie; Duchemin, Jean-Bernard; Paradkar, Prasad; Nahavandi, Saeid; Bhatti, Asim. Electrophysiological evidence of RML12 mosquito cell line towards neuronal differentiation by 20-hydroxyecdysone. *Scientific Reports*. 2018; 8(1 -):10109. <https://doi.org/10.1038/s41598-018-28357-2>
- 12 Gaburro, Julie; Paradkar, Prasad; Klein, Melissa; Bhatti, Asim; Nahavandi, Saeid; Duchemin, Jean-Bernard. Dengue virus infection changes *Aedes aegypti* oviposition olfactory preferences. *Scientific Reports*. 2018; 8:13179. <https://doi.org/10.1038/s41598-018-31608-x>
- 13 Hayes, Keith; Hosack, Geoff; Dana, Genya; Foster, Scott; Ford, Jessica; Thresher, Ron; et al. Identifying and detecting potentially adverse ecological outcomes associated with the release of gene-drive modified organisms. *Journal of Responsible Innovation*. 2018; 5(Suppl 1):S139-S158. <https://doi.org/10.1080/23299460.2017.1415585>
- 14 Horsington, Jacquelyn; Nfon, Charles; Bittner, Hilary; Durr, Peter; Singanallur Balasubramani, Nagendra; Alexandersen, Soren; et al. The protective capacity of high payload A22 IRQ vaccine in sheep against direct-contact challenge with a heterologous, contemporary A strain from South East Asia. *PLoS ONE*. 2018; 13(6):e0195302. <https://doi.org/10.1371/journal.pone.0195302>
- 15 Horsington, Jacquelyn; Nfon, Charles; Gonzales, Jose; Singanallur Balasubramani, Nagendra; Bittner, Hilary; Vosloo, Wilna. Protection in Sheep Against Heterologous Challenge with Serotype Asia-1 Foot-and-Mouth Disease Virus Using High Potency Vaccine. *Vaccine*. 2018; 36(41):6095.
- 16 Jenkins, Kristie; Cooper, Caitlin; Challagulla, Arjun; Tizard, Mark; Doran, Tim. Innovative approaches to genome editing in avian species. *Journal of Animal Science and Biotechnology*. 2018; 9(15 0):7. <https://doi.org/10.1186/s40104-018-0231-7>
- 17 Klein, Reuben; Middleton, Deborah. Virus-neutralising antibody responses in horses following vaccination with Equivac® HeV: a field study. *Australian Veterinary Journal*. 2018; 96(5):161-166. <https://doi.org/10.1111/avj.12689>
- 18 Kohl, Claudia; Tachedjian, Mary; Todd, Shawn; Monaghan, Paul; Boyd, Vicky; Marsh, Glenn; et al. Hervey virus: Study on co-circulation with Henipaviruses in Pteropid bats within their distribution range from Australia to Africa. *PLoS ONE*. 2018; 13(2):e0191933. <https://doi.org/10.1371/journal.pone.0191933>
- 19 McKimm-Breschkin, Jenny; Barrett, Sue; Wong, Frank; Pudjiatmoko, Pak; Azhar, Muhammad; Selleck, Paul; et al. Identification of Indonesia clade 2.1 highly pathogenic influenza A (H5N1) viruses with N294D and S246N neuraminidase substitutions with further reduce oseltamivir susceptibility. *Antiviral Research*. 2018; 153:95-100.
- 20 Neave, Matthew; Hall, Robyn; Huang, Nina; McColl, Ken; Kerr, Peter; Hoehn, Marion; et al. Robust innate immunity of young rabbits mediates resistance to rabbit haemorrhagic disease caused by *Lagovirus europaeus* GI.1 but not GI.2. *Viruses*. 2018; 10:512. <https://doi.org/10.3390/v10090512>
- 21 O'Brien, Daniel; Athan, Eugene; Blasdell, Kim; De Barro, Paul. Tackling the worsening epidemic of Buruli ulcer in Australia in an information void: time for an urgent scientific response. *Medical Journal of Australia*. 2018; 208(7):287-289. <https://doi.org/10.5694/mja17.00879>
- 22 Rawlinson, Stephen; Zhao, Tianyue; Rozario, Ashley; Rootes, Chris; McMillan, Paul; Purcell, Anthony; et al. Viral regulation of host cell biology by hijacking of the nucleolar DNA-damage response. *Nature Communications*. 2018; 9(1):305. <https://doi.org/10.1038/s41467-018-05354-7>
- 23 Smith, Ina; Tachedjian, Mary; Marsh, Glenn; Eagles, Debbie. Reemergence of Reston ebolavirus in *Cynomolgus* Monkeys, the Philippines, 2015. *Emerging Infectious Diseases*. 2018; 24(7):1285-1291. <https://doi.org/10.3201/eid2407.171234>
- 24 Stephenson, Garth; Morris, Kirsten; O'Neil, Terri; Bruce, Matt; Strom, David; Bean, Andrew. Characterisation of

the porcine cytokines which activate the CD131(beta c) common sub-unit, for potential immune-augmentation. *Cytokine*. 2018; 102:131-140.

25 Tachedjian, Mary; Baker, Michelle. Differential Evolution of Antiretroviral Restriction Factors in Pteropid Bats as Revealed by APOBEC3 Gene Complexity. *Molecular Biology Evolution*. 2018; 35(7):1626-1637.

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26 Walker, Peter; Blasdel, Kim; Calisher, Charles; Dietzgen, Ralph; Kondo, Hideki; Kurath, Gael; et al. ICTV Virus Taxonomy Profile: Rhabdoviridae. *Journal of General Virology*. 2018; 99(4):447-448.

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d) Other

(Provide website address or link to appropriate information): 2

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2. Luczo, Jasmina; Tachedjian, Mary; Harper, Jenni; Butler, Jeff; Sapats, Sandra; Lowther, Sue; et al. Evolution of high pathogenicity of H5 avian influenza virus: haemagglutinin cleavage site selection of reverse-genetics mutants during passage in chickens. www.nature.com/scientificreports: Springer Nature; 2018. csiro:EP186821.

Following on from ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries Question number 6, there was no further option for additional lines. Therefore please see Q6 continued below;

A Backstopping mission at the National Institute of High Security Animal Diseases

India

10

A Backstopping mission at the Official Laboratory of Veterinary, Food and Phytopathology of New Caledonia (LNC)

New Caledonia 10

A Backstopping mission at the Central Veterinary Laboratory

Nepal 10