OIE Collaborating Centres Reports Activities

Activities in 2017

This report has been submitted : 2018-01-05 20:03:56

Title of collaborating centre:	Diseases at the Animal/Human Interface
Address of Collaborating Centre:	Laboratorio di Parassitologia Viale dell'Università, 10 35020 Legnaro (PD) ITALY
Tel.:	+39-049 808 43 74
Fax:	+39-049 808 43 60
E-mail address:	gcapelli@izsvenezie.it
Website:	www.izsvenezie.it
Name of Director of Institute (Responsible Official):	Prof.Daniele Benardini Director General IZSVe Viale dell'Università 10 – 35020 Legnaro (PD) - Italy
Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Gioia Capelli, DVM, PhD, Dipl.EVPC, Specialist™ in Parasitology Professor of Veterinary Parasitology, Head of the Laboratory of Parasitology at IZSVe-Viale dell'Università 10 – 35020 Legnaro (PD) - Italy
Name of writer:	Gioia Capelli Head of Parasitology Lab; Paola De Benedictis Head Laboratory for zoonoses, emerging and reemerging pathogens; Fabrizio Montarsi-Entomology; Carco Citterio-Wildlife; Maria Serena Beato-biobanking

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**
Study on larval competition between the invasive mosquitoes Aedes koreicus and Ae. albopictus	Aedes koreicus and Aedes albopictus are two invasive mosquito species well established in northeastern Italy, and these two species may co-occur in artificial larval habitats. We investigated larval competition between Ae. koreicus and Ae. albopictus using two diet levels (low level and high level) and 10 density combination levels. We showed a significant effect of the density combination on Ae. koreicus survivorship, female development time, and female wing length. There was a significant reduction of Ae. koreicus survivorship in 20:10 combination treatments (i.e. 20 Ae. albopictus and 10 Ae. koreicus larvae) compared to other combination treatments, while no difference was detected for Ae. albopictus between density combination treatments. Our results show weak larval competition between Ae. koreicus and Ae. albopictus with a slight advantage of the latter species. On the other hand, the presence of Ae. albopictus seems to favor the emergence of larger Ae. koreicus females. We suggest that factors such as habitats preferences or seasonal distributions may be determinant for the invasion success of Ae. koreicus.
Control of mosquito vectors	In Europe, Aedes albopictus is an invasive mosquito species known to be a major nuisance as well as a vector of a range of arboviruses. In this study, we examined two Ae. albopictus control strategies that implemented a community-based approach in northern Italy: one was a partial intervention that included a public education campaign and the larviciding of public spaces, and the other was a full intervention that additionally included a door-to-door campaign. This latter consisted of going door to door actively to educate residents about control measures and deliver larvicide tablets for treating catch basins at home. A site where no intervention measures were carried out was used as a control. Ae. albopictus populations were most effectively reduced by larviciding both public and private catch basins. Door-to-door education was effective in convincing residents to apply control measures on their property; however, this method was labour intensive and costly. It may be possible to reduce personnel costs by involving volunteers or using a 'hot spot' approach.

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	**Scope**
Surveillance activity of bat populations as reservoirs of rabies related lyssaviruses in Italy	Bats have recently been associated with viruses with zoonotic potential. Among these, rabies related lyssaviruses (RRLYSV) have been reported from several European countries. Our Department is involved in the active surveillance of synanthropic Myotis myotis in Northern Italy, which have the peculiarity of living in churches. In 2017, two maternity colonies with serological evidence for the circulation of RRLYSV were monitored longitudinally throughout the season. Briefly, during each sampling campaign we live-sampled 30 individuals from each colony, collecting blood and saliva samples for serological and virological analyses, respectively. In the same period, we also investigated the connectivity between the animals roosting in these colonies but also in others, as long as they were located within the Bolzano province for a maximum distance of 70 km. In particular, we used the individual DNA extracted from wing biopsies and combined genetic analyses for nuclear and mitochondrial markers, using respectively 11 published microsatellites and the control region of the mitochondrion.
new target for the surveillance of tick-borne diseases	North-eastern Italy represents a hot spot of several tick-borne pathogens (TBPs), mainly transmitted by Ixodes ricinus to animals and humans. We compared the molecular monitoring on ticks for surveillance of zoonotic TBPs to the monitoring of red foxes (Vulpes vulpes) collected in the same area. In the previous years nine different pathogens were found in Ixodes ricinus ticks, namely Rickettsia helvetica (3.7%) and R. monacensis (0.5%), four species of B. burgdorferi s.l. complex (B. afzelii 1.5%, B. burgdorferi s.s. 1.2%, B. garinii 0.18% and B. valaisiana 0.18%), A. phagocytophilum (3.2%), Cand. N. mikurensis (1.7%) and Babesia venatorum (0.04%). None of the pathogens found in ticks was detectable in 97 foxes, which showed instead 54% positive for Babesia cf. microti (also referred as Babesia microti-like, Theileria annae, Babesia annae, Babesia vulpes). The monitoring of tick-borne pathogens in the specific epidemiological context of north-eastern Italy cannot be based on foxes as sentinel animals
Surveillance of zoonotic tick-borne pathogens	Dogs are a common feeding hosts for Ixodes ricinus and may act as reservoir hosts for zoonotic tick-borne pathogens (TBPs) and as carriers of infected ticks into human settings. A total of 212 Ixodes ricinus specimens were collected from the coat of domestic dogs living in urban and suburban settings in central Italy. Sixty-one ticks (28.8%) tested positive for TBPs. Rickettsia spp. was detected in 39 specimens (18.4%), of which 32 were identified as Rickettsia monacensis and seven as Rickettsia helvetica. Twenty-two samples (10.4%) tested positive for A. phagocytophilum; Borrelia lusitaniae and Borrelia afzelii were detected in two specimens and one specimen, respectively. One tick (0.5%) was found to be positive for Babesia venatorum (EU1). There is a significant exposure of dogs to TBPs of public health concern.

prevention of the transmission of mosquito-borne pathogens	In non-endemic areas, arboviral infections are increasingly causing outbreaks of diseases such as chikungunya and dengue. We collaborate to assess the epidemiological effectiveness and economic costs/benefits of routine larviciding in European towns with temperate climate, using a mathematical model of Aedes albopictus populations and viral transmission, calibrated on entomological surveillance data collected from ten municipalities in Northern Italy in 2014-2015. We found that routine larviciding of public catch basins can limit both the risk of autochthonous transmission and the size of potential epidemics. Ideal larvicide interventions should be timed to cover the month of July. Optimally timed larviciding can reduce locally transmitted cases of chikungunya by 20-33% for a single application (dengue: 18-22%) and up to 43-65% if treatment is repeated four times (dengue: 31-51%). In larger municipalities (>35,000 inhabitants), the cost of comprehensive larviciding over the whole urban area overcomes potential health benefits related to preventing cases of disease, suggesting the adoption of more localized interventions. Small/medium sized towns with high mosquito abundance will likely have a positive cost-benefit balance. Results from this study may support the planning and timing of interventions aimed to reduce the probability of autochthonous transmission as well as the nuisance for local populations living in temperate areas of Europe.
origin and dispersion of the West Nile virus lineage 2 epidemic in Europe and Italy	We collaborated to reconstruct the origin and dispersion of WNV-2 in Central Europe and Italy on a phylodynamic and phylogeographical basis. Discrete and continuous space phylogeographical models were applied to a total of 33 newly characterised full-length viral genomes obtained from mosquitoes, birds and humans in Northern in 2013-2015, aligned with 64 complete sequences isolated mainly in Europe. The European isolates segregated into two highly significant clades: a small one including three sequences and a large clade including the majority of isolates obtained in Central Europe since 2004. Discrete phylogeographical analysis showed that the most probable location of the root of the largest European clade was in Hungary a mean 12.78 years ago. The European clade bifurcated into two highly supported subclades: one including most of the Central/East European isolates and the other encompassing all of the isolates obtained in Greece. The continuous space phylogeographical analysis of the Italian clade showed that WNV-2 entered Italy in about 2008, probably by crossing the Adriatic sea and reaching a central area of the Po Valley. The epidemic then spread simultaneously eastward and westward. Over a period of about seven years, the virus spread all over an area of northern Italy by following the Po river and its main tributaries.
Methods of surveillance of invasive mosquitoes	Aedes koreicus, Aedes albopictus and Aedes japonicus japonicus have already colonized a large part of northeastern Italy and other European countries. We conducted a 2-yr longitudinal survey using adult traps to investigate the spatiotemporal distribution of Ae. koreicus and evaluated the effectiveness of three trapping devices in Latin square experiments conducted in an urban site and a forested site. The following three different traps were compared: a CO_2-baited Biogents (BG) Sentinel trap, a CO_2-baited Centers for Disease Control and Prevention light trap (CDC trap), and a grass infusion-baited gravid trap. The BG Sentinel and gravid traps collected significantly more Ae. koreicus than the CDC trap in the urban site, whereas there was no significant difference between the three traps in the forested site. In the urban site, the BG Sentinel trap and the gravid trap were the most effective for collecting Ae. albopictus and Culex pipiens L., respectively. In the forested site, Cx. pipiens was primarily collected by the CDC trap.

Vector-competence of invasive mosquitoes for zoonotic pathogens	The mosquito-borne filarial nematodes Dirofilaria immitis and Dirofilaria repens primarily affect dogs but also cats, causing heartworm disease or subcutaneous dirofilariosis, respectively, and both may also cause zoonotic diseases in humans. We collaborate to study the development of both nematodes under standardised experimental laboratory conditions in mosquitoes.In field-collected Ae. japonicus infectious L3 larvae of both D. immitis and D. repens developed, rendering this mosquito species an efficient vector for both filarial species. Additionally, Ae. geniculatus was shown to be an equally efficient vector for both filarial species. Aedes japonicus mosquitoes from a laboratory colony were refractory to D. immitis but susceptible to D. repens, whereas Ae. aegypti was refractory to both filarial species. The data emphasize the necessity to perform vector competence studies with local mosquito populations as basis for risk assessments.
Epidemiology of Hepatitis E in large game	Europe was traditionally considered as non-endemic for HEV, with few sporadic travel-related cases returning from endemic countries. Recently autochthonous HEV cases increased outside the endemic foci. Interestingly, locally-acquired infections in these new areas were associated not only with consumption of undercooked pork (being domestic pigs the main reservoir), but also with wild boar and deer. In the framework of a dedicated research program, 1773 samples were collected in 436 wild ungulates (39 roe deer, 32 red deer, 7 fallow deer and 358 wild boar), in cooperation with local wildlife management authorities, hunting associations and health authorities. Immunodiagnosis and RT-PCR to detect the virus were performed. In 2017, only wild boars (5 seropositives, 2 virus-positives) were found positive, all culled in a restricted area where overpopulation represents a serious issue and interaction between farmed pigs and wild boar is also likely to occur. Phylogenetic analysis showed that the two HEV isolates seem to cluster with other strains previously found in Italy, but further analysis is scheduled for a deeper characterization, that will be associated to investigation on risk factors for spillover from pigs to wild boar, spillback from wild boar to farmed pigs and transmission to humans (in particular, people working with and manipulating wildlife, potentially exposed due to professional reasons).
surveillance of Trichinellosis in wild mammals	The regular monitoring of wild life, such as wild boar, foxes or other indicator animals is an important tool for assessing changes in disease prevalence. In order to enhance the control system in accordance with the actual public health risks we have implemented a surveillance system on wildlife hunted or found dead. During 2017, 8785 wild animals were controlled including 5887 wild boars, 2156 red foxes (Vulpes vulpes), 742 mustelids. All samples were negative confirming the low prevalence of Trichinellosis in north-eastern Italy.

Wildlife	
Title of activity	**Scope**

Prioritization of diseases in wild ungulate populations	Due to the dramatic increase and spread of ungulate population in the eastern Italian Alps, contacts at the wild-domestic and animal-human interface and circulation of pathogens have been consistently increasing. In 2017, a project aimed at prioritizing infectious diseases of wild ungulates was concluded. A research team composed of scientific experts, sociologists and statisticians was involved to implement the prioritization. A team of scientific experts identified 26 infectious diseases, of which 12 zoonoses. The Nominal Group combined with the Focus Group was then implemented with 2 medical doctors, 4 veterinarians and 4 wildlife managers, in order to identify the relevant criteria for diseases prioritization. 30 criteria were established and weighed by these experts. The Delphi method was then applied by an online questionnaire submitted to 8 veterinarians and 7 medical doctors, to evaluate each disease through the identified criteria, assigning to each criterion a severity score from 1 to 5. For each disease, the weighed score of each criterion (as defined in the second phase) was multiplied by the criterion severity score obtained. The total for each of the 30 criteria were added up to obtain the final score of each disease. In this way, two lists were produced: one related to non-zoonotic diseases, and the other to zoonoses. The results of this prioritization process will be useful for planning health surveillance activities in the territory of interest.
Management of wild ungulate population data	Besides the knowledge of the pathogens, the efficacy of any possible control measure of wildlife diseases is related to the knowledge of the ecology and demography of the host population/s. For this purpose, IZSVe has been developing since 2014 a metadata and data management platform, aimed at collecting and collating wild population data relevant for surveillance, management and control of diseases in wildlife. We started by wild ungulates due to their high abundance, large distribution and frequent interaction with livestock and humans, but the inclusion of other taxonomical groups is scheduled for the future. An official Agreement between IZSVe and local Partners in charge for wildlife management and conservation is in force for this aim, and the wild ungulate population metadata catalogue and the geo-database of wild ungulate population data have been built according to the 2007/2/EC INSPIRE (Infrastructure for Spatial Information in Europe) Directive. The development of this platform is a continuous work in progress that has been prosecuted also in 2017.
Disease surveillance and food safety at game control centres	Game control centres are facilities in which wild game culled during regular hunting can be properly stored and inspected. Their distribution is likely to become more widespread in North-Eastern Italy and, due to the increasing interest in game meat, they are expected to assume a basic role for both surveillance on important diseases and food safety. In such a situation, it is worthwhile to draw shared protocols, so that data could be more easily compared and analyzed among different administrative units. In 2017, a project representing the first attempt to collect and organize information concerning game control centres at a medium-wide geographical range was concluded. The project allowed to produce a map of the presence and distribution of game control centres; a basic protocol for passive surveillance on prioritary diseases, including some important zoonoses; a training programme for hunters, gamekeepers and veterinarians focused on wildlife disease surveillance and an Information Technology model, integrated within the wider georeferenced infrastructure of the wildlife surveillance network, taking into account the distribution and characteristics of the game control centres. These data are already informing also activities on zoonotic pathogens to investigate on which active surveillance is needed, as toxoplasmosis and other food-borne diseases.

Evaluation of cost/effective methods to monitor the red fox population trend	Improving the knowledge on the distribution and status of the wild populations is desirable to inform strategies for disease surveillance, early detection and control. Unfortunately, even a basic knowledge remains difficult to acquire for some species, as the red fox, the distribution and dynamics of which remains difficult to estimate for many reasons. The red fox represents the main reservoir of wild rabies in Europe, also playing a basic role in the epidemiology of other zoonoses as Trichinella and Echinococcus multilocularis. Therefore this carnivore is a prioritary species at the animal/human interface and it is worthwhile to develop and evaluate methods to acquire systematic and comparable data on fox populations. For this purpose, five-year indices of kilometric abundance of foxes, obtained during spring night counts scheduled on red deer, were analyzed in 75 transects in an alpine area where two subsequent epizootics had occurred: the first caused by rabies (from late 2009 until early 2011, when it was eradicated) and the second by canine distemper. In summary, relative abundance of foxes resulted as associated to the year, showing a pattern biologically consistent with the trend in fox rabies and distemper as derived from passive surveillance. IKA analysis appears as promising in detecting fox population trend variations, including those caused by epizootics of diseases inducing high mortality.

Diagnosis, biotechnology and laboratory

Title of activity	Scope
Diagnostic activity for Flaviviruses	The seasonal routine surveillance activity for Flaviviruses in Northeastern Italy (Veneto, Friuli Venezia Giulia, Trento and Bolzano provinces) continued also in 2017. As of December 31st, 2017 a total of 3130 equine sera (of which 88 tested positive) were analyzed for the presence of anti-West Nile virus (WNV) IgM (West Nile IGM capture ID-VET®) and 556 samples (equine and wild birds blood/organs, 25 of which tested positive) were screened for the detection of WNV through Real Time RT-PCR. All doubtful and positive samples were sent to the National Reference Centre for Exotic Diseases of animals (Centro Studi Malattie Esotiche; CESME, Teramo, Italy) for laboratory confirmation.
Diagnostic activities on rabies	Within the 2017 national surveillance activities for rabies, 1,742 brain samples were analyzed by using the direct Fluorescent Antibody Test (FAT); of these, 955 samples were from red foxes, 35 from bats and 208 from domestic animals. The remaining samples (about 500) were taken from wild animals. Samples from domestic carnivores and from cases of exposure to wild or symptomatic animals were analysed also by rabies tissue culture infection test (RTCIT) and RTPCR. Assessment of vaccination efficacy through the fluorescent antibody virus neutralisation (FAVN) test was performed on all the submitted sera samples. A total of 3,488 sera were tested (3,344 from pets, 37 from wildlife and 107 of human origin). In addition, 416 bat sera were analyses by rapid fluorescent focus inhibition test (RFFIT). Being a reference point also for human beings, in 2017 the CC has continued to offer scientific support to Italian public hospitals and health centres.

Biobanking	Since 2014, IZSVe has started a project in collaboration with the OIE Collaborating Centre for Veterinary Biological Biobank in Italy (IZSLER), to set an internal Biobank. The OIE Reference laboratory for AI and NDV and OIE Reference Laboratory for Rabies were involved since the beginning in such activity. IZSVe implemented the use of a common software with the OIE Collaborating Centre for Veterinary Biological Biobank, in order to publish the available biological resources on the same web platform (http://biowarehouse.it/index.php/search/?IZS=IZSVE). From a research perspective, the availability of samples correctly stored, identified and traced may have an outcome in analysis, publishing, and dissemination of important epizoological data to the international scientific community on zoonotic pathogens. The availability of veterinary biobank will certainly aid to address relevant animal and public health issues globally. Such infrastructure, which provide samples, information and expertise all together could be considered tools to respond to EID addressing the origin and distribution of pathogens. Veterinary biobanks may promote intersectional collaborations and networking in the scientific community and contribute to render operative the One health concept in policy and practice. From this perspective, the IZSVe veterinary biobank is part of the whole asset of scientific collections and can indirectly contribute to improve global health.

Vaccines

Title of activity	**Scope**
OFFLU-Vaccine Composition Meeting (VCM). Antigenic and genetic characteristics of zoonotic influenza viruses and candidate vaccine viruses developed for potential use in human vaccines	The WHO Global Influenza Surveillance and Response System (GISRS) is a key player in monitoring the evolution and spread of influenza viruses and recommending the strains to be used in human influenza vaccines. For almost a decade, OFFLU (OIE/FAO Network of expertise on animal influenza) has also contributed to the WHO vaccine strain selection process (VCM) by providing global level data on avian influenza viruses, particularly subtypes H5N1 and H9N2. In the reporting period the IZSVe, in its role as OFFLU laboratory, has further contributed to this initiative by generating genetic and antigenic information on zoonotic influenza, in particular for subtypes H5N1, H5N8 and H9N2. The data were shared with the OFFLU network to be presented during the WHO Consultations on the Composition of Influenza Virus Vaccines, which were held in February and September 2017.

Other (Name the category)

Title of activity	**Scope**
Host-pathogen interactions in the evolution of alpha and betacoronaviruses in chiropterans	Coronaviruses (CoVs) are characterized by high genetic diversity and a wide geographical range in bats, which suggests a long-standing host association. Through extensive phylogenetic and co-evolutionary analyses we investigated the respective roles of virus-host co-divergence versus cross-species transmission in the evolution of bat CoVs. We found that CoV diversity is related to the richness and distribution of bats species, and that bat CoVs exhibit genus-specific clustering which is consistent with the definition of distinctive CoV species. Co-phylogenetic analyses revealed that cross-species transmission was more common than co-divergence in the evolution of Alphacoronavirus and Betacoronavirus. Our analysis also suggested that cross-species transmission events occurred more likely between sympatric hosts, which possibly means that increased geographic encroachment with bats might initiate additional host-jumping events. However, phylogenetic analyses based on the RNA polymerase suggested that most of these host-jumps likely resulted in short-term spill-over infections, with little evidence for sustained onward transmission in new co-roosting host species.

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
xx	xx	☒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
Federal Research Institute for Animal Health. Friedrich-Loeffler-Institute (OIE CC for Zoonoses)	Greifswald	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	OFFLU VCM Consultation on the Composition of Influenza Virus Vaccines for the Northern Hemisphere
EURLP European Reference Laboraroy for Parasitoses	Rome	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Collaboration on diagnosis and surveillance of zoonotic agents

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
ANSES (OIE RL for rabies)	Nancy	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	To provide Preparedness, Prediction and Prevention of Emerging Zoonotic Viruses with Pandemic Potential using Multidisciplinary Approaches (PREDEMICS project -FP7/2007-2013).
ANSES, OIE RL for rabies (PT organiser)	Nancy	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Participation to both EU proficiency tests for: 1) diagnosis of rabies; 2) rabies antibody detection in wildlife samples (foxes).
Animal Health and Veterinary Laboratories Agency now called Animal and Plant Health Agency-APHA (OIE RL for avian influenza and Newcastle disease (PT organiser)	Surrey (UK)	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Participation to the EU proficiency test for the diagnosis of avian influenza and Newcastle Disease
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G.Caporale" (OIE RL for West Nile Fever - PT organiser)	Teramo	☐Africa ☐Americas ☐Asia and Pacific ☒Europe ☐Middle East	Participation to the national proficiency test for the diagnosis of West Nile Fever
The National Centre for Foreign Animal Disease (NCFAD) of the Canadian Food Inspection Agency(OIE RL for Avian Influenza and for Bovine Spongiform Encephalopathy (BSE))	Winnipeg	☐Africa ☒Americas ☐Asia and Pacific ☐Europe ☐Middle East	The purpose is to enhance and strengthen health promotion and research capacities by collaborating in diagnostic and vaccine developments for influenza viruses; training of research personnel; sharing of viruses, reagents, facilities

Medical Research Council, University of Glasgow Centre for Virus Research - CVR (OIE CC Viral Genomics and Bioinformatics)	Glasgow	☐Africa ☒Americas ☒Asia and Pacific ☒Europe ☐Middle East	OIE-ad hoc group on high throughput sequencing,Bioinformatics and computational Genomics (HTS-BCG)
Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna "Bruno Ubertini" - IZSLER (OIE CC Veterinary Biologicals Biobank)	Brescia	☐Africa ☒Americas ☒Asia and Pacific ☒Europe ☐Middle East	OIE-ad hoc group on high throughput sequencing, Bioinformatics and computational Genomics (HTS-BCG)
Australian Animal Health Laboratory CSIRO Livestock Industries (OIE CC Laboratory Capacity Building)	Surrey (UK)	☐Africa ☒Americas ☒Asia and Pacific ☒Europe ☐Middle East	OFFLU VCM Consultation on the Composition of Influenza Virus Vaccines for the Northern Hemisphere
CSIRO Newcomb CSIRO Australian Animal Health Laboratory (AAHL (OIE CC Diagnostic Test Validation Science in the Asia-Pacific Region)	Victoria	☐Africa ☒Americas ☒Asia and Pacific ☒Europe ☐Middle East	OFFLU VCM Consultation on the Composition of Influenza Virus Vaccines for the Northern Hemisphere
China Animal Health and Epidemiology Center (CAECH (Multi-national OIE CC Veterinary Epidemiology and Public Health)	Qingdao	☐Africa ☒Americas ☒Asia and Pacific ☒Europe ☐Middle East	OFFLU VCM Consultation on the Composition of Influenza Virus Vaccines for the Northern Hemisphere

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
Fusaro Alice	Attendance at OIE seminar	12th OIE Seminar, Sorrento, Italy 7-10/06/2017
Monne Isabella	Attendance at OIE meeting	OFFLU Avian Influenza Virus Characterization meeting, Rome, Italy 28/03/2017

Monne Isabella	Invited expert	9th WHO Working Group Meeting. RT-PCR for the detection and subtyping of influenza viruses and the use of NGS in GISRS, center for Health Protection (CHP), Hong Kong, China 10-16/04/2017
Monne Isabella	Invited expert	OIE ad hoc Group on High Throughput Sequencing, Bioinformatics and Computational Genomics, Paris, France 26-29/06/2017
Terregino Calogero	Attendance at OIE meeting	Joint meeting of CVO/CMO/HSC on Influenza Preparedness in the context of One Health, Bruxelles, Belgium 19-21/04/2017

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: 2
b) Seminars: 22
c) Hands-on training courses: 14
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	Serological methods for diagnosis of ND viruses	Italy	1
a	Mosquito borne viral diseases: dengue, chikungunya and flaviviruses	France	1
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Bangladesh	1
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Bhutan	1
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Iraq	1
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Iran	9
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Libia	1
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Morocco	1

b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Pakistan	3
b	Workshop on Surveillance and Control of Rabies(TC IZSVe-Teheran)	Turkey	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Botswana	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Burkina Faso	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Cameroon	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Chad	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Congo	2
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Cote d'Ivoire	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Ethiopia	2
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Kenya	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Mali	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Mozambique	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Namibia	1

b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Senegal	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Tanzania	1
b, c	Training Course on the Diagnosis of Transboundary Animal Diseases: Early Detection and Characterisation (Ethiopia)	Zambia	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

1.Chaudhry, M., Rashid, H.B., Angot, A., Thrusfield, M., Welburn, S.C., deC Bronsvoort, B.M., Capua, I., Cattoli, G., & Eisler, M.C. (2017). Avian influenza A in poultry stalls of Lahore District, Pakistan in 2009-2010.74, 609-611. The Journal of infection, Jun doi:S0163-4453(17)30085-3 [pii]

2.De Benedictis, P., Minola, A., Nodari, E.R., Aiello, R., Lanzavecchia, A., Bourhy, H., & Corti, D. (2016). Monoclonal antibody-mediated clearance of rabies virus from the central nervous system: Implications for future approaches to rabies therapy. International Journal of Infectious Diseases, Vol. 53, 19-20 Dec. 2016

3.El Romeh, A., Zecchin, B., Fusaro, A., Ibrahim, E., El Bazzal, B., El Hage, J., Milani, A., Zamperin, G., & Monne, I. (2017). Highly Pathogenic Avian Influenza H5N1 Clade 2.3.2.1c Virus in Lebanon, 2016.61, 271-273. Avian Diseases, Jun doi:10.1637/11544-113016-Case.1

4.Harris, K.A., Freidl, G.S., Munoz, O.S., von Dobschuetz, S., De Nardi, M., Wieland, B., Koopmans, M.P.G., Stark, K.D.C., van Reeth, K., Dauphin, G., Meijer, A., de Bruin, E., Capua, I., Hill, A.A., Kosmider, R., Banks, J., Stevens, K., van der Werf, S., Enouf, V., van der Meulen, K., Brown, I.H., Alexander, D.J., Breed, A.C., & FLURISK Consortium. (2017). Epidemiological Risk Factors for Animal Influenza A Viruses Overcoming Species Barriers.14, 342-360. EcoHealth, Jun doi:10.1007/s10393-017-1244-y

5.Lelli D, Beato MS, Cavicchio L, Lavazza A, Chiapponi C, Leopardi S, Baioni L, De Benedictis P, Moreno A. First identification of mammalian orthoreovirus type 3 in diarrheic pigs in Europe. Virol J. 2016 Aug 12;13:139. doi: 10.1186/s12985-016-0593-4.

6.Naguib, M., Graaf, A., Fortin, A., Luttermann, C., Wernery, U., Amarin, N., Hussein, H., Sultan, H., Al Adhadh, B., & Hassan, M. (2017). Novel real-time PCR-based patho-and phylotyping of potentially zoonotic avian influenza A subtype H5 viruses at risk of incursion into Europe in 2017.22 Euro Surveill.

7.Ravagnan, S., Mastrorilli, E., Da Rold, G., Losasso, C., Milani, A., Ricci, A., et al. (2017). Analysis of tick's microbial populations to identify known and emerging pathogens: a metagenomic approach. Collana di Monografie Veterinaria Italiana, 26, 82

8.Alho AM, Lima C, Latrofa MS, Colella V, Ravagnan S, Capelli G, Madeira de Carvalho L, Cardoso L , Otranto D. “Molecular detection of vector-borne pathogens in dogs and cats from Qatar.” Parasites & Vectors (2017) 10:298.

9.Baldacchino F, Montarsi F, Arnoldi D, Barategui C, Ferro Milone N, Da Rold G, Capelli G, Rizzoli A. “A 2-yr Mosquito Survey Focusing on Aedes koreicus (Diptera: Culicidae) in Northern Italy and Implications for Adult Trapping.” J Med Entomol. 2017 May 1;54(3):622-630. doi: 10.1093/jme/tjw216.

10.Beltrame A, Danesi P, Farina C, Orza P, Perandin F, Zanardello C, Rodari P, Staffolani S, Bisoffi Z. Case Report: Molecular Confirmation of Lobomycosis in an Italian Traveler Acquired in the Amazon Region of Venezuela. Am J Trop Med Hyg.2017 Sep 25. doi: 10.4269/ajtmh.17-0446

11.Danesi P, Ravagnan S, Johnson LR, Furlanello T, Milani A, Martin P, Boyd S, Best M, Galgut B, Irwin P, Canfield PJ, Krockenberger MB, Halliday C, Meyer W, Malik R. Molecular diagnosis of Pneumocystis pneumonia in dogs. Med Mycol. 2017. Nov 1;55(8):828-842. doi: 10.1093/mmy/myx007

12.Latrofa M.S., Angelou A., Giannelli A., Annoscia G., Ravagnan S., Dantas-Torres F., Capelli G., Halos L., Beugnet F., Papadopoulos E., Otranto D. “Ticks and associated pathogens in dogs from Greece.” Parasites & Vectors (2017) 10:301

13.Mancini G., Montarsi F., Calzolari M., Capelli G., Dottori M., Ravagnan S., Lelli D., Chiari M., Santilli A., Quaglia M., Federici V., Monaco F., Goffredo M., Savini G. “Mosquito species involved in the circulation of West Nile and Usutu viruses in Italy.” Veterinaria Italiana 2017, 53 (2), 97-110.

14.Magliano A, Scaramozzino P, Ravagnan S, Montarsi F, DA Rold G, Cincinelli G, Moni A, Silvestri P, Carvelli A, De Liberato C. "Indoor and outdoor winter activity of Culicoides biting midges, vectors of bluetongue virus, in Italy.” Med Vet Entomol. 2017 Aug 22

15.Ravagnan S., Carli E., Piseddu E., Da Rold G., Porcellato E., Zanardello C., Carminato A., Vascellari M., Capelli G. “Prevalence and molecular characterization of canine and feline hemotropic mycoplasmas (hemoplasmas) in northern Italy.” Parasit Vectors. 2017 Mar 13;10(1):132.

16.Zehender G, Veo C, Ebranati E, Carta V, Rovida F, Percivalle E, Moreno A, Lelli D, Calzolari M, Lavazza A, Chiapponi C, Baioni L, Capelli G, Ravagnan S, Da Rold G, Lavezzo E, Palù G, Baldanti F, Barzon L, Galli M. “Reconstructing the recent West Nile virus lineage 2 epidemic in Europe and Italy using discrete and continuous phylogeography”. PLoS One. 2017 Jul 5;12(7):e0179679.

17.Guzzetta G, Trentini F, Poletti P, Baldacchino FA, Montarsi F, Capelli G, Rizzoli A, Rosà R, Merler S, Melegaro A. Effectiveness and economic assessment of routine larviciding for prevention of chikungunya and dengue in temperate urbansettings in Europe. PLoS Negl Trop Dis. 2017 Sep 11;11(9):e0005918. doi:10.1371/journal.pntd.0005918.

18.Brianti E, Falsone L, Napoli E, Gaglio G, Giannetto S, Pennisi MG, Priolo V, Latrofa MS, Tarallo VD, Solari Basano F, Nazzari R, Deuster K, Pollmeier M, Gulotta L, Colella V, Dantas-Torres F, Capelli G, Otranto D. Prevention of feline leishmaniosis with an imidacloprid 10%/flumethrin 4.5% polymer matrix collar. Parasit Vectors. 2017 Jul 14;10(1):334. doi: 10.1186/s13071-017-2258-6.

19.Baldacchino F, Arnoldi D, Lapère C, Rosà R, Montarsi F, Capelli G, Rizzoli A. Weak Larval Competition Between Two Invasive Mosquitoes Aedes koreicus and Aedes albopictus (Diptera: Culicidae). J Med Entomol. 2017 Sep 1;54(5):1266-1272. doi: 10.1093/jme/tjx093.

20.Baldacchino F, Montarsi F, Arnoldi D, Barategui C, Ferro Milone N, Da Rold G, Capelli G, Rizzoli A. A 2-yr Mosquito Survey Focusing on Aedes koreicus (Diptera: Culicidae) in Northern Italy and Implications for Adult Trapping. J Med Entomol. 2017 May 1;54(3):622-630. doi: 10.1093/jme/tjw216.

21.Otranto D, Napoli E, Latrofa MS, Annoscia G, Tarallo VD, Greco G, Lorusso E, Gulotta L, Falsone L, Basano FS, Pennisi MG, Deuster K, Capelli G, Dantas-Torres F, Brianti E. Feline and canine leishmaniosis and other vector-borne diseases in the Aeolian Islands: Pathogen and vector circulation in a confined environment. Vet Parasitol. 2017 Mar 15;236:144-151. doi: 10.1016/j.vetpar.2017.01.019.

22.Marini G, Guzzetta G, Baldacchino F, Arnoldi D, Montarsi F, Capelli G, Rizzoli A, Merler S, Rosà R. The effect of interspecific competition on the temporal dynamics of Aedes albopictus and Culex pipiens. Parasit Vectors. 2017 Feb 23;10(1):102. doi: 10.1186/s13071-017-2041-8.

23.Silaghi C, Beck R, Capelli G, Montarsi F, Mathis A. Development of Dirofilaria immitis and Dirofilaria repens in Aedes japonicus and Aedes geniculatus. Parasit Vectors. 2017 Feb 20;10(1):94. doi: 10.1186/s13071-017-2015-x.

24.Ciocchetta S, Darbro JM, Frentiu FD, Montarsi F, Capelli G, Aaskov JG, Devine GJ. Laboratory colonization of the European invasive mosquito Aedes (Finlaya) koreicus. Parasit Vectors. 2017 Feb 10;10(1):74. doi: 10.1186/s13071-017-2010-2.

25.Baldacchino F, Bussola F, Arnoldi D, Marcantonio M, Montarsi F, Capelli G, Rosà R, Rizzoli A. An integrated pest control strategy against the Asian tiger mosquito in northern Italy: a case study. Pest Manag Sci. 2017 Jan;73(1):87-93. doi: 10.1002/ps.4417.

b) International conferences: 15

1.Bonfante, F., Mazzetto, E., Gervasi, M., Veronese, P., Tran, M., Giaquinto, C., De Benedictis, P., Capua, I. & Terregino, C. (2017). Zika virus replication at the placental interface: the role of non-neutralizing immunity. 10th European Congress on Tropical Medicine and International Health (ECTMIH), 16-20 October 2017, Antwerp, Belgium

2.Danesi P., Krockenberger M., Schmertmann L., Meyer W., Canfield P., Malik R.(2017). Cryptococcosis in wild animals. 10° International Conference on Cryptococcus and Cryptococcosis, 24 marzo – 1 aprile 2017, Foz do Iguacu, Brazil.

3.Da Rold G., Soppelsa F, Favero A, Seno G, Soppelsa M, Obber F, Citterio C, Montarsi F, Ravagnan S, Capelli G. “Ticks or animal sentinels for the monitoring of vector-borne pathogens in endemic areas?“ Abstract book final conference on neglected vectors and vector-borne diseases (EurNegVec). 11-13 September 2017 Chania, Crete. Pag 17.

4.Da Rold G., Montarsi F., Drigo I., Carlin S., Danesi P., Veronesi E., Silaghi C., Mathis A., Rizzoli A., Capelli G., Ravagnan S. “MALDI TOF MS: a tool for the rapid species identification of adult mosquitoes.” VIII conference European Mosquito Control Association (EMCA). 12-16 March 2017 Montenegro pag. 110

5.De Benedictis, P., Minola, A., Rota Nodari, E., Aiello, R., Lanzavecchia, A., Bourhy, H. & Corti, D. (2016). Monoclonal antibody-mediated clearance of rabies virus from the central nervous system: Implications for future approaches to rabies therapy. IMED 2016 - International Meeting on Emerging Diseases and Surveillance, 4-7 novembre 2016, Vienna, Austria

6.Fusaro, A., Zamperin, G., Milani, A., Schivo, A., Monne, I., Vio, D., Schiavon, E., Giorgiutti, M., Castellan, A., Mion, M. & Beato, M.S. (2017). Identification of novel European Swine Influenza genotypes in Italy between 2013 and 2016. 9th European Symposium of Porcine Health Management (ESPHM) - Proceedings, (p. 451). 3-5 May 2017, Praga, Czech Republic

7.Fusaro, A., Zamperin, G., Milani, A., Schivo, A., Salviato, A., Panzarin, V. & Monne, I. (2017). Virus Bioinformatics at IZSVe. 1st Meeting of the European Virus Bionformatics Centre, 05-08 March 2017, Jena, Germany

8.Lelli, D., Prosperi, A., Chiapponi, C., De Benedictis, P., Gibellini, A., Leopardi, S., Sozzi, E., Scaravelli, D., Moreno, A. & Lavazza, A. (2017). Characterization of a novel Rhabdovirus isolated from insectivorous bat (Pipistrellus kuhlii) in Italy. 2nd International Symposium on Infectious Diseases of Bats - Proceedings, (p. 23). 29 June - 1 July 2017, Fort Collins, Colorado (USA)

9.Leopardi, S., Tassoni, L., Priori, P., Gastaldelli, M., Scaravelli, D. & De Benedictis, P. (2016). Host-symbionts interactions between bats and coronaviruses . IMED 2016 - International Meeting on Emerging Diseases and Surveillance, 4-7 novembre 2016, Vienna, Austria

10.Montarsi F., Ravagnan S., Carlin S., Da Rold G., Porcellato E., Palei M., Russo F., Capelli G. “Entomological surveillance for West Nile disease in North-eastern Italy and importance of public health”. Abstract book final conference on neglected vectors and vector-borne diseases (EurNegVec). 11-13 September 2017 Chania, Crete.

Pag 38.

11.Montarsi F., Visentin P., Drago A., Ravagnan S., Della Torre A., Capelli G., Pombi M. “Comparative Testing of Two Sticky Traps to Monitor Resting Aedes koreicus (Diptera: Culicidae) in Italy.” VIII conference European Mosquito Control Association (EMCA). 12-16 March 2017 Montenegro pag. 71

12.Ravagnan S, Mastrorilli E, Montarsi F, Da Rold G, Milani A, Salviato A, Losasso C, Monne I, Ricci A, Capelli G. “Metagenomic approach to identify pathogens and symbionts of Ixodes ricinus ticks: preliminary results”. Abstract book final conference on neglected vectors and vector-borne diseases (EurNegVec). 11-13 September 2017 Chania, Crete. Pag 57.

13.Ravagnan S., Carli E., Piseddu E., Da Rold G., Porcellato E., Zanardello C., Carminato A., Vascellari M., Capelli G. Prevalence and molecular characterization of canine and feline hemotropic Mycoplasmas (haemoplasmas) in northern Italy. Proceeding 12th Symposium of the Canine Vector Borne Disease (CVBD) World Forum, Athens Greece 13-16 March 2017, pag. 19.

14.Sartore S., Mulatti P., Mazzucato M., Ravagnan S., Montarsi F., Gagliazzo L., Bonfanti L. “Cost assessment of integrated surveillance plans for West Nile Disease (WND) in north-eastern Italy”. Meeting international society for economics and social sciences of animal health (ISESSAH). 27-28 March 2017, Aviemore, Scotland pag.122

15.Venkatesh, D., Lopes, S., Van Reeth, K., Simon, G., Foni, E., Beato, M., Fusaro, A., Larsen, L., Smietanka, K., Durrwald, R., Beer, M., Brookes, S., Brown, I., Loeffen, W., Vincent, A. & Lewis, N. (2017). The molecular basis of the global antigenic diversity of the Haemagglutinin HA protein in swine influenza A viruses. The American Society for Virology (ASV) - 36th Annual Meeting, 24-28 June 2017, Madison, Wisconsin (USA)

c) National conferences: 3
1.Fassina, C., Leopardi, S. & Piras, G. (2017) Attività di recupero dei Chirotteri in Veneto: nuovi interessanti dati per l’anno in corso. VIII Convegno dei Faunisti Veneti, 21-22 October 2017, Sedico (BL), Italy

2.Leopardi, S., Zecchin, B., Priori, P., Ciullo, S., Scaravelli, D. & De Benedictis, P. (2017). Disease dynamics of EBLV1 in colonies of Myotis myotis in northern Italy. IV IV Congresso Nazionale di Ecopatologia della Fauna SIEF - Società Italiana di Ecopatologia della Fauna, 11-13 October 2017, Domodossola, Italy

3.Scaravelli, D., Priori, P., Ladurner, E., Drescher, C., Leopardi, S. & De Benedictis, P. 2017Approcci multidisciplinari alla conservazione di specie a rischio: le colonie di grandi Myotis in Alto Adige. VIII Convegno dei Faunisti Veneti, 21-22 October 2017, Sedico (BL), Italy

d) Other
(Provide website address or link to appropriate information): 13
1.NRL and OIE Collaborating Centre for diseases at the Animal/Human Interface(IZSVE)
http://www.izsvenezie.com/reference-laboratories/diseases-at-the-animalhuman-interface/
2.NRL for Rabies (IZSVE)
http://www.izsvenezie.com/reference-laboratories/rabies/
3.NRL and OIE Reference laboratory for Avian Influenza and Newcastle disease (IZSVE)
http://www.izsvenezie.com/reference-laboratories/avian-influenza-and-newcastle-disease/
4.NRC for animal assisted intervention (pet therapy)
http://www.izsvenezie.com/reference-laboratories/pet-therapy/
5.OFFLU - OIE/FAO Network of Expertise on Animal Influenza
http://www.offlu.net
6.FP7-PREDEMICS - Preparedness, Prediction and Prevention of Emerging Zoonotic Viruses with Pandemic Potential using Multidisciplinary Approaches
http://predemics.biomedtrain.eu/cms/Default.aspx?page=17689&Menu=494
7.ZikAction - Preparedness, research and action network on maternal-paediatric axis of Zika virus infection in Latin America and the Caribbean
http://penta-id.org/news.html
8.Interreg V A Italy-Austria "BIO CRIME"
http://www.biocrime.org/
9.FP7 - Infect-ERA, TORRENT Towards a combined post-exposure prophylaxis and successful treatment of rabies in humans.
http://www.infect-era.eu/4th-call-2016
10.CHAFEA/2016/BTSF/03: Organisation and implementation of training activities on controls of movements of dogs and cats

http://www.foodinfo-europe.com/training-programs/modc2017-2019
11.WHO Rabies Bulletin Europe
www.who-rabies-bulletin.org/
12. European Network for Neglected Vectors and Vector-Borne Infections (EURNEGVEC)
http://www.cost.eu/COST_Actions/bmbs/TD1303
13. Biobanking http://www.izsvenezie.com/activities-services/veterinary-biobank/