

OIE Collaborating Centres Reports Activities

Activities in 2019

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Title of collaborating centre:	Diseases at the Animal/Human Interface
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Name of writer:	Gioia Capelli

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

<p>Support to the control of vector-borne diseases:Equine and Wild bird diagnostic activities on Flavivirus</p>	<p>In 2019, during the active surveillance of syndromic cases in horses a total of 164 sera were submitted for antibodies detection against WNV (commercial IgM ELISA kit); 2 sera out of 164 resulted positive for IgM against WNV.</p> <p>Virological analyses in horses were performed from organs collected during necropsy of a euthanized and syndromic horse resulted positive for WNV lineage 2 via duplex one-step reverse transcriptase Real Time PCR.</p> <p>During both active and passive surveillance of WNV and USUV virological analyses were performed in wild bird a total of 1228 birds were analysed via duplex one-step reverse transcriptase Real Time PCRs.; of these 8 wild birds resulted positive for WNV lineage 2 (magpie, hooded crow, wood pigeon and egret).</p>
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<p>Support to the control of cystic echinococcosis in Italy</p>	<p>We collaborated to this study aimed to estimate the prevalence of ovine cystic echinococcosis (CE) in Italy. Survey data on the prevalence of Echinococcus granulosus complex in Italian sheep farms from 2010 to 2015 were obtained in collaboration with Regional Veterinary Epidemiology Observatories (OEVs). Bayesian analysis was performed to estimate the true CE farm prevalence. Bayesian modelling of the observed prevalence in different regions were used to ultimately estimate the prevalence of ovine CE in Italy. We obtained survey data from 10 OEVs, covering 14 Italian regions. We observed that the risk of CE infection decreased over the years, and it was strictly correlated with the density of susceptible species. Using Sardinia as prior distribution, where the disease farm prevalence was approximately 19% (95% CI, 18.82-20.02), we estimated that the highest endemic CE farm prevalence was in Basilicata with a value of 12% (95% BCI: 7.49-18.9%) and in Piemonte 7.64%(95% BCI: 4.12-13.04%). Our results provide spatially relevant data crucial for guiding CE control in Italy. Precise information on disease occurrence location would aid in the identification of priority areas for disease control implementation by the authorities. The current underestimation of CE occurrence should urge the Italian and European governments to become aware of the public health importance of CE and implement targeted interventions for high-risk areas</p>
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<p>Monitoring of Insecticides resistance in <i>Aedes albopictus</i></p>	<p>Pyrethroid insecticides represent the main tools for limiting the circulation of mosquito-borne viruses. We collaborated to this study aimed to extend previous reports on phenotypic pyrethroid-resistance in European <i>Ae. albopictus</i>, to identify its genetic basis and to monitor the geographical distribution of resistant genotypes, with a particular focus on sites experiencing the 2017 chikungunya outbreak in Italy.</p> <p>Bioassays, performed according to World Health Organization protocols, showed full susceptibility to deltamethrin (concentration = 0.05%) and varying levels of resistance to permethrin (0.75%) and/or α-cypermethrin (0.05%) across Italy, with highest levels in the core of the 2017 chikungunya outbreak. Partial genotyping of the VSSC gene revealed widespread distribution of V1016G mutation and confirmed its association with pyrethroid resistance.</p> <p>The results obtained show that the condition for the spread of pyrethroid resistance in <i>Ae. albopictus</i> in Europe exists under strong selective pressure due to intensive insecticide spraying to control exotic arbovirus outbreak or high levels of nuisance.</p>
<p>Epidemiology, surveillance, risk assessment, modelling</p>	
<p>Title of activity</p>	<p>Scope</p>

<p>Study of the evolutionary dynamics of West Nile virus</p>	<p>Since its re-emergence in Italy in 2008, the West Nile virus (WNV) has become endemic in the north-east of the country, and has proved to be extremely dangerous to certain at-risk groups (immunocompromised individuals, the elderly, children, etc.) to the point of developing reliable and trustworthy methods for the prompt detection of viral re-emergence. To date, the knowledge of WNV transmission dynamics in north-eastern Italy is limited. To fill this gap, partial sequences (600 nucleotides) of the genome of 273 WNVs identified in mosquitoes (N=267) and birds (N=6) from the Veneto and Friuli Venezia Giulia regions were analysed. Phylogenetic analyses showed that Italian viruses belong to lineage II and group with viruses that have been circulating in northern and eastern Europe. We reconstructed the spatial and temporal dynamics of the introduction and spread of the virus in Italy, identifying 3 different WNV introductions from eastern Europe, dating back to 2001-2004, 2008-2010 and 2011-2016. In north-eastern Italy, Rovigo province has played the role of principal donor site, from which the virus has spread to neighbouring provinces. Based on the available data, none of the genetic variants circulating in Italy seems to have spread to other European countries.</p>
<p>Characterization of Usutu viruses isolated from mosquitoes</p>	<p>Surveillance plans activated after the WNV emergency in 2008 highlighted the endemicity of USUTU virus (USUV) in northern Italy. The increasing numbers of USUV human cases have highlighted the importance of implementing and strengthening surveillance systems in endemic areas. The project "Evolutionary trajectory of the USUTU virus in north-eastern Italy and risk assessment of transmission to humans by blood transfusion" aims to explore the evolutionary and spatial dynamics of USUV to implement the surveillance system implementation. For this purpose we sequenced the complete genome of 138 USUV, from mosquitoes (N=125) and birds (N=13), identified in the period 2011-2018 in north-eastern Italy. Phylogenetic analyses show that the viruses from north-eastern Italy belong to the EU2 lineage and form two clusters (A-B): cluster A includes 2009-2018 USUVs from central-northern Italy, Austria and Hungary, while cluster B includes only Italian viruses identified in 2009-2016. Bayesian analyses of the EU2 lineage show that the genetic diversity of the viral population has progressively increased since its introduction, which supposedly dates back to 2008. Spatial analyses show that Venice, Treviso and Vicenza provinces play a key role in the transmission of the virus to neighbouring areas.</p>
<p>Hepatitis E in game in north-eastern Italy</p>	<p>In Italy, the domestic pig represents the main reservoir of Hepatitis E, in particular for zoonotic genotypes 3 and 4, but it seems that even the wild boar has been playing an important role. The research project "RC IZSve 14/15", which ended in August 2019, had the purpose of verifying the prevalence and distribution of Hepatitis E virus (HEV) in the main species of wild ungulates in north-eastern Italy, assessing the risk of transmission to humans following consumption of game meat. Virological and serological data showed that, among wild species, the HEV circulation appears limited to wild boar in the Euganean Hills area. Sequencing (ORF1, ORF2 and the complete genome) and phylogenetic analysis of 9 viruses collected in 2017 allowed us to identify a new subtype within genotype 3. Subsequently in 2018, the characterization of the complete genome of a HEV virus, identified in a wild boar in Padua province, was also performed. The phylogenetic analyses showed that the virus belongs to the zoonotic genotype 3f and groups separately from the Euganean Hills viruses characterized during the research. This represents the first identification of genotype 3f in the wild boar in this region.</p>

Monitoring mosquito populations for Flaviviridae in north-eastern Italy	In 2019, we placed 72 CDC-CO2 mosquito traps over the area and collected 197185 mosquitoes of 15 different species. Viral search was done in 2932 pooled specimens. West Nile virus was detected in 18 pools of <i>Culex pipiens</i> and USUTU virus in 31 pools of <i>Culex pipiens</i> , <i>Ochlerotatus caspius</i> and <i>Aedes albopictus</i> .
New approach to outbreak management for bovine Cystic Echinococcosis (CE)	The study applied a new approach based on targeted epidemiological surveys in areas with aggregation of bovine CE cases, and compared the outcome with that of two control areas with farms individually investigated. The presence of territorial cluster of bovine farms with CE cases was investigated for 3 consecutive years (2013-2014-2015) in a high-risk area of Veneto Region (north-eastern Italy), using a spatial scan statistic. Epidemiological investigations, consisting of a questionnaire survey and canine faecal samples collection, were conducted in cluster and control areas. In total, 99 farms were surveyed and 208 faecal samples were retrieved from dogs. Sixty-two farms (42 bovine and 20 sheep) were investigated in cluster areas and 37 farms (33 bovine and 4 sheep) in control areas. Based on the results of the cestode egg isolation procedure, 14 animals (6.7%) were positive to taeniid eggs. For molecular analysis, two dogs resulted positive to <i>Echinococcus granulosus</i> , and seven to <i>Taenia hydatigena</i> . Twelve positive dogs were found in targeted survey areas and ten of these dogs were shepherd dogs, belonging to transhumant sheep flocks known to pass in cluster areas. The new approach demonstrated to successfully identify the probable source of infection of CE positive bovines. Most of positive dogs belonged to transhumant flocks, underlining the importance to include shepherd dogs in the surveillance system for CE
Cost-effective surveillance of <i>Ixodes ricinus</i> ticks and associated pathogens through modelling	Various ticks exist in the temperate hilly and pre-alpine areas of Northern Italy, where <i>Ixodes ricinus</i> is the more important. In this area different tick-borne pathogen monitoring projects have recently been implemented. We collaborated to this study presenting the results of a two year field survey of ticks and associated pathogens, conducted 2009-2010 in North-eastern Italy. The cost-effectiveness of different sampling strategies, hypothesized a posteriori based on two sub-sets of data, were compared and analysed. The same two subsets were also used to develop models of habitat suitability, using a maximum entropy algorithm based on remotely sensed data. Comparison of the two strategies (in terms of number of ticks collected, rates of pathogen detection and model accuracy) indicated that monitoring at many temporary sites was more cost-effective than monthly samplings at a few permanent sites. The two model predictions were similar and provided a greater understanding of ecological requirements of <i>I. ricinus</i> in the study area. Dense vegetation cover, as measured by the normalized difference vegetation index, was identified as a good predictor of tick presence, whereas high summer temperatures appeared to be a limiting factor. The study suggests that it is possible to obtain realistic results (in terms of pathogens detection and development of habitat suitability maps) with a relatively limited sampling effort and a well planned monitoring strategy

Mammalian Orthoreovirus (MRV): circulation in populations of BATs and swine in Italy	MRVs are segmented RNA viruses showing wide host and geographical range. MRV infection, mostly asymptomatic, may cause diarrhea and encephalitis in newborns. In 2015, we first reported MRV in Italian pigs, phylogenetically related with bat and human strains. We applied ecological and virological methods to characterize the interface bats/pigs in intensive Italian farms and to investigate the ability of pigs to maintain, amplify and reassort MRVs of bat origin. We showed the high activity and biodiversity of bats, likely related to the abundance of insects in the sewage tanks and to the diversity of shelters. Despite bats seem to avoid pig shelters, the presence of guano just outside the entrance and in the food storage room provide evidence for indirect exposure. We found MRVs in bats and pigs, with no phylogenetic correlation. A single strain circulated in pigs, suggesting intra-species transmission. However, while 8/10 segments clustered with a strain previously found in the same population, the correlation of S1 and M2 with bat MRVs supported a reassortment event. It's impossible to foresee whether new pathogens may emerge at this interface, but the high contact between pigs and many bat species suggests the indirect occurrence of viral exchange through faeces. Pig's exposure to bat viruses was supported by the detection of live MRV in guano from farms. Also, virological data in pigs suggest that they might act both as intermediate and amplifying hosts for bat viruses
Monitoring the focus of Echinococcus multilocularis in red fox	In 2019, The Centre offered a diagnostic service for the search of Echinococcus multilocularis eggs and subsequent molecular characterization in fox feces (Vulpes vulpes) from the area of competence. In total, 374 foxes were examined. The presence of the parasite was confirmed in 5 (1.3%) foxes in the province of Bolzano, confirming the presence of the pre-existing outbreak.
Surveillance of Invasive mosquitoes	<p>We monitored the entry and spread of invasive species of mosquitoes of the genus Aedes, through the surveillance of certain "Point of entry" such as the port of Marghera, the airport of Venice, the airport of Treviso. In the port of Marghera and in Tessera airport, only mosquitoes of the Aedes albopictus species have been observed, spread throughout the port and airport area.</p> <p>For the first time, two adult specimens of the Aedes koreicus species (identification confirmed by molecular biology method) were found at the Treviso airport in July and October October.</p>
Training, capacity building	
Title of activity	Scope
Provision of positive controls for diagnosis and research	The CC provided to public and private Institutions extracted DNA/RNA of viruses, bacteria and protozoan transmitted by arthropods vectors, fungal pathogens and specimens of invasive mosquitoes (eggs, larvae and adults)
Zoonoses	
Title of activity	Scope
diagnosis and surveillance of other zoonosis	The Centre also offers diagnosis, research and surveillance for other zoonoses such as Q fever in livestock; leptospirosis in dogs, cats, pigs, horses and ruminants; dermatofitoses in dogs, cats and horses (Microsporum and Trichophyton); other vector-borne pathogens of pets and livestock (Anaplasma, Leishmania, Borrelia, tick-borne encephalitis, Rickettsia, Bartonella and piroplasms).

Wildlife	
Title of activity	Scope
Support to the epidemiology and surveillance of trichinellosis	We monitored 11596 wild animals for <i>Trichinella</i> spp., including wild boars (10153), red foxes (819) wolves (16), golden jackals (11) and mustelids (578). Monitoring is still ongoing, but currently none has tested positive.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Standardization and validation of molecular diagnostic tests for zoonosis	In 2019 the CC validated a multiplex PCR for the detection in fecal samples of carnivores of <i>Echinococcus granulosus</i> , <i>E. multilocularis</i> and other tenids
Standardization and validation of molecular diagnostic tests for pathogens transmitted by vectors	In 2019 the CC validated a real-time PCR for the diagnosis of hemoplasmas transmitted by fleas
Standardization and validation of microscopic diagnostic tests	In 2019 the CC validated through ring test the filth-test, for the diagnosis of insects infesting food staff
Development and characterization of neuraminidase inhibitors for animal and human paramyxovirus	Through a the collaboration with I.R.C.S.S. Policlinico San Donato and the Universities of Milan and Copenhagen, the reference centre has developed an in vitro model for the characterization of the antiviral activity of compounds derived from the 2-deoxy-2,3-didehydro-N-acetylneuraminic acid (DANA) molecule. The compounds have been tested against the Newcastle Disease Virus (NDV), as a model for human parainfluenza virus type 3 (hPIV3), a pathogen that may cause severe respiratory infection in young children. NDV is a good translational model for hPIV3 considering the high identity between the two viruses in terms of HN protein structure and binding site of antiviral drugs with anti-neuraminidase activity. The study has defined: a) the main mechanism of action of the drugs as anti-sialidase, no significant inhibition of the virus attachment was observed; b) the potency, significantly higher than commercial molecules, according to the in vitro results; c) the cytotoxicity and the selectivity index (S.I.), with promising results for an in vivo study, since S.I. values for many of these molecules range between 10.000 and 100.000. Since for some of the molecules in this study a patent is under evaluation, it is impossible to give further technical-scientific details. The translational model will be validated comparing viral inhibition assays performed on NDV with those on hPIV3.
Development and validation of a high-throughput serological method for the diagnosis and surveillance of infections caused by DENGUE and ZIKA viruses	Within the framework of the ZIKAction project, financed under the H2020 programme, the researchers at the IZSve Reference Centre have modified the traditional titration method for flaviviruses, which is based on a plaque count assay. The traditional method for titration of Zika virus and related flaviviruses generally requires 96 to 120 hours of culture on susceptible cell monolayers for the visualization of plaques, made visible to the naked eye by application of a dye. The plaque assay method is at the basis of the serological technique of the plaque reduction neutralization test (PRNT) which is considered the gold standard method to assess the immunological profile of a patient with previous exposure to more than one flavivirus (e.g. Dengue virus serotype 1 to 4 and/or Zika virus). The PRNT assay has been modified in order for it to be performed on a 96 wells plate with the visualization of viral plaques in 44 hours. Visualization of plaques is obtained with an immunocytochemical staining method using a pan-flavivirus antibody (4G2). The modifications made to the assay allowed a reduction in the turnaround time and the volume of sample required and made possible its use in large scale to test a great number of samples, fulfilling the requirements for a high-throughput screening assay.

<p>Characterization of the viral tropism and growth of Zika virus in term placental explants</p>	<p>In the framework of the Horizon2020 funding program, the ZIKAction project aims at understanding the drivers that determines the vertical transmission of Zika viruses from mothers to babies during pregnancy. In this reporting period viruses from both the Asian (French Polynesia and Honduras/15 strains) and African (MR766) lineage were characterized, to characterize their replication profile in human placental explants of the third trimester. Differences in the replication of viruses on explants have been further investigated by means of deep sequencing and by testing viruses for their binding and replicative phenotypes, using placental cell lines of different origin, namely trophoblast and macrophages. RNAseq analyses are currently ongoing to unravel the host-dependent mechanism underpinning the replication and crossing of the placental barrier.</p> <p>Differences in the envelope lipid composition of Zika viruses appear to correlate with the minimum infectious dose of placental tissues, a result that shall be further investigated to identify the specific viral factors underpinning this phenomenon.</p>
Other (Name the category)	
Title of activity	Scope
<p>Influence of temperature on the bionomics and population dynamics of <i>Aedes koreicus</i></p>	<p><i>Aedes koreicus</i> was detected in northern Italy for the first time in 2011, and it is now well established in several areas as a new invasive mosquito species. We experimentally investigated the influence of different constant rearing temperatures (between 4 and 33 °C) on the survival rates and developmental times of different life stages of <i>Ae. koreicus</i> under laboratory conditions. The resulting data were subsequently used to inform a mathematical model reproducing the <i>Ae. koreicus</i> life-cycle calibrated to counts of adult females captured in the field in the autonomous province of Trento (northern Italy) between 2016 and 2018. We found that temperatures above 28 °C are not optimal for the survival of pupae and adults, whereas temperate conditions of 23-28 °C seem to be very favorable, explaining the recent success of <i>Ae. koreicus</i> at establishing into new specific areas. Our results indicate that <i>Ae. koreicus</i> is less adapted to local climatic conditions compared to <i>Ae. albopictus</i>, another invasive species which has been invading the area for the last three decades. Warmer seasons, which are more likely to occur in the future because of climate change, might extend the breeding time and therefore increase the abundance of <i>Ae. koreicus</i> in the study region. Our findings provide, the first evidence on how temperature influences the bionomics and dynamics of <i>Ae. koreicus</i> and highlight the need for further studies on the phenology of this species in temperate areas of Europe</p>

<p>Spread of <i>Aedes japonicus japonicus</i> in Italy</p>	<p>The invasive mosquito species, <i>Aedes japonicus japonicus</i>, was detected in northeastern Italy for the first time in 2015, at the border with Austria. This study is the results of four years (2015-2018) of activity. The presence of <i>Ae. j. japonicus</i> was checked in all possible breeding sites through collections of larvae. The monitoring started from the site of the first detection at the Austrian border and then was extended in all directions. The mosquitoes were identified morphologically and molecularly. <i>Aedes j. japonicus</i> was found in 58 out of 73 municipalities monitored (79.5%). In total, 238 sampling sites were monitored and 90 were positive for presence of <i>Ae. j. japonicus</i> larvae (37.8%). The mosquito was collected mainly in artificial containers located in small villages and in rural areas. <i>Aedes j. japonicus</i> is well established in Italy and in only four years has colonised two Italian Regions, displaying rapid spreading throughout hilly and mountainous areas. Colonization towards the south seems limited by climatic conditions and the occurrence of a large population of the larval competitor, <i>Ae. albopictus</i>. The further spread of <i>Ae. j. japonicus</i> has the potential to pose new threats of zoonotic agents (i.e. <i>Dirofilaria</i> spp. and West Nile virus) within areas at altitudes previously considered at negligible risk in Italy</p>
<p>Spatio-Temporal Dynamics of <i>Aedes Albopictus</i> Dispersal</p>	<p>The increasing number of exotic arbovirus cases imported in Europe and the 2017 chikungunya outbreak in central/southern Italy highlight the urgency of evidence-based outbreak management plans to predict, prevent or interrupt spreading of these arboviruses to non-endemic countries in temperate regions. We here present the results of three mark-release-recapture experiments conducted in a peri-urban area of North-East Italy to estimate the spatio-temporal dynamics of the dispersal of <i>Aedes albopictus</i> females looking for oviposition sites. The Flight Range of 90% of the mosquito population (FR90) was found to exceed 200 m, consistently with data obtained from a previous study conducted in a highly urbanised area in Rome (Central Italy). Modelling results showed that dispersal can be so rapid that insecticide spraying within a 200m-radius around a potential infected case leaves >10% probability that a potentially infected mosquito escapes the treatment, even if this is carried out after only 2-3 days since the importation of a viremic case. These data provide evidence in favour of an update of guidelines for the control of exotic autochthonous arbovirus transmission in temperate areas and highlight the need of effective surveillance approaches and rapid response to contain the risks associated to imported viremic cases</p>

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	<input 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
National Centre for Foreign Animal Disease of the Canadian Food Inspection Agency (NCFAD)	Winnipeg (Canada)	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Research studies focusing, among the others, on investigating zoonotic viral agents including animal influenza viruses
Aedes Invasive Mosquitoes (AIM-COST)	Europe	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	COST Action CA17108. A transboundary network across Europe to establish a cost effective management of the risk of introduction and spread of Exotic Invasive Aedes Mosquito Borne Viruses. Partners from 19 countries

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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<p>Medical Research Council</p> <p>University of Glasgow Centre for Virus Research - CVR</p> <p>(OIE CC Viral Genomics and Bioinformatics)</p>	<p>Glasgow (United Kingdom)</p>	<p><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>	<p>OIE-ad hoc group on high throughput sequencing,</p> <p>Bioinformatics and computational Genomics (HTS-BCG)</p>
<p>Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna "Bruno Ubertini"- IZSLER</p> <p>(OIE CC Veterinary Biologicals Biobank)</p>	<p>Brescia (Italy)</p>	<p><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>	<p>OIE-ad hoc group on high throughput sequencing,</p> <p>Bioinformatics and computational Genomics (HTS-BCG)</p>
<p>Australian Animal Health Laboratory</p> <p>CSIRO Livestock Industries (OIE CC Laboratory Capacity Building)</p>	<p>Victoria (Australia)</p>	<p><input type="checkbox"/>Africa <input type="checkbox"/>Americas <input checked="" type="checkbox"/>Asia and Pacific <input type="checkbox"/>Europe <input type="checkbox"/>Middle East</p>	<p>OIE-ad hoc group on high throughput sequencing,</p> <p>Bioinformatics and computational Genomics (HTS-BCG)</p>
<p>ZIKAction, Horizon2020 - Grant Agreement 734857 of the EU Commission DG for research and innovation</p>	<p>Coordinator: INSERM (France)</p>	<p><input checked="" 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>	<p>Interdisciplinary programme of research studies to address key knowledge gaps related to ZIKV epidemiology, natural history and pathogenesis, focusing on maternal and child health</p>

PRIMA CALL - Medirab	Spain, Tunisia, Morocco, Italy	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	Strategies for the control of rabies in North African Mediterranean countries and the prevention of importation into Europe. Despite investigating the present situation of rabies in Tunisia and Morocco, this project also focuses on bat rabies, as it is likely that natural movements of bats might be responsible of shared pathogens across the Mediterranean countries, included rabies related lyssaviruses.
BIO-CRIME Interreg VA Italy-Austria	Europe	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	Organisation and implementation of training activities on controls of movements of dogs and cats: i.e. intra-Union trade, imports and non-commercial movements
EUREGIO Project - ConBAT Combining BAT Conservation and spillover Control	Funded interregional project networks - Italy	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	Investigating the ecology of Myotis myotis throughout the EUREGIO area with the aim of studying LYSV
Institute of Microbiology and Immunology, Medical Faculty of Ljubljana	Ljubljana, Slovenia	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input checked="" type="checkbox"/> Europe <input type="checkbox"/> Middle East	Mammalian Orthoreovirus isolates to be tested for their capability of growing in different cell substrates, including immortalized cell cultures, primary cells and organ explants from several host species. Some of the viral strains will be used as reference material in pathogenetic studies aiming to identify the viral patterns that might enhance the likelihood for spill-over events.
IVO De Carneri Tanzania	Zanzibar Archipelago	<input checked="" type="checkbox"/> Africa <input type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Providing support for public health programs in the area, one of the world's most affected by parasitic and infectious diseases

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
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Gioia Capelli	WHO Workshop 15-17 October, Sofia - Bulgaria	Vector Borne Disease Operational Readiness Workshop
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ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

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

Yes

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

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
d	Diagnosis and surveillance of zoonosis	Italy	1
b	On-line course " Non-commercial handling of pets according Reg. (UE) 576/2013 and Reg. (UE) 577/2013	Italy	456
b	On-line course: "Artropod vectors of pathogens to humans and animals: mosquitoes"	Italy	308

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: 18

1. Dantas-Torres F, Miró G, Baneth G, Bourdeau P, Breitschwerdt E, Capelli G, Cardoso L, Day MJ, Dobler G, Ferrer L, Irwin P, Jongejan F, Kempf VAJ, Kohn B, Lappin M, Little S, Madder M, Maggi R, Maia C, Marcondes M, Naucke T, Oliva G, Pennisi MG, Penzhorn BL, Peregrine A, Pfeffer M, Roura X, Sainz A, Shin S, Solano-Gallego L, Straubinger RK, Tasker S, Traub R, Wright I, Bowman DD, Gradoni L, Otranto D. Canine Leishmaniasis Control in the Context of One Health. *Emerg Infect Dis*. 2019 Dec;25(12):1-4.

2. Marini G, Arnoldi D, Baldacchino F, Capelli G, Guzzetta G, Merler S, Montarsi F, Rizzoli A, Rosà R. First report of the influence of temperature on the bionomics and population dynamics of *Aedes koreicus*, a new invasive alien species in Europe. *Parasit Vectors*. 2019 Nov 6;12(1):524.

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c) National conferences: 10

1. Gallochio, F., Biancotto, G., Moressa, A., Arcangeli, G., Toffan, A., Pascoli, F. & Ricci, A. .Bioaccumulation study of titanium dioxide nanoparticles in edible mussels. 19/C1, (p. 27). ISTISAN Congressi. 18 February 2019, Roma, Italy

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6. Falcaro C., Furlanello T., Menchetti M., Bonfanti U., Binanti D., Fondati A., Krockenberger M., Malik R., P. Danesi. Diagnosi Molecolare di Prototheca nel Cane. Atti del XIXI Congresso Nazionale S.I.Di.L.V., Matera, 25 ottobre 2019

7. La Spisa Ma, Idrizi Ia, Sandonà Cb, Natale Ab, Kluge Dc, Trevisiol K. Caso studio di un focolaio di Febbre Q in un'azienda con produzione e lavorazione di latte crudo caprino nella Provincia Autonoma di Bolzano. Atti del XIXI Congresso Nazionale S.I.Di.L.V., Matera, 25 ottobre 2019

8. Obber F., Bregoli M., Trevisiol K., Dellamaria D., Bragagna P., Capovilla P., Capelli G., Danesi P., Citterio C. L'echinococcosi cistica. Wilde, La rivista del cacciatore a palla, pagg. 68-73, n°9 Luglio/Agosto 2019

9. Obber F., Bregoli M., Trevisiol K., Dellamaria D., Bragagna P., Capovilla P., Danesi P., Capelli G., Citterio C. V. Echinococcosi cistica: alcune informazioni sulla malattia e sui corretti comportamenti da seguire - Caccia 2000, pagg. 16-19, n° Agosto 2019

10. Toniolo F., Porcellato E., Cazzin S., Cagnin V., Pretto T., Manfrin A., Capelli G., Ravagnan S. Identificazione Molecolare di Trematodi Digenei di interesse Veterinario ed Umano. Atti del XIXI Congresso Nazionale S.I.Di.L.V., Matera, 25 ottobre 2019

d) Other

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

Video: How to protect yourself from mosquitoes and transmitted pathogens
<https://www.izsvenezie.it/come-proteggersi-dalle-zanzare-video/>

Video: How to protect your dog from the ticks:
<https://www.izsvenezie.it/come-proteggere-il-cane-dalle-zecche-video/>

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