

WOAH Collaborative Centre Reports Activities 2022

Activities in 2022

This report has been submitted : 8 février 2023 13:08

Centre Information

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TOR1 AND 2: SERVICES PROVIDED

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

epidemiology, surveillance, risk assessment

Title of activity	Scope
	In 2022, 76 CDC-CO2 mosquito traps were placed over the area and 103611 mosquitoes of 17 different species were collected.

<p>Entomological surveillance for West Nile and Usutu viruses in north-eastern Italy</p>	<p>The viral search was done in 2,568 pooled specimens. West Nile virus was detected in 106 pools of <i>Culex pipiens</i>, and in 2 pool of <i>Ochlerotatus caspius</i> and <i>Aedes albopictus</i>. USUTU virus was found in 18 pools of <i>Cx. pipiens</i>.</p>
<p>epidemiology, surveillance, risk assessment</p>	
<p>Title of activity</p>	<p>Scope</p>
<p>Surveillance of Invasive mosquitoes in "Points of entry"</p>	<p>Monitoring of the entry and spread of invasive species of mosquitoes of the genus <i>Aedes</i>, through the surveillance of selected "Points of entry" such as the port of Marghera (Venice) and the airport of Venice and Treviso (northeast Italy). <i>Aedes albopictus</i> species have been collected in all sites, while no other invasive species were found.</p>
<p>epidemiology, surveillance, risk assessment</p>	
<p>Title of activity</p>	<p>Scope</p>
<p>Surveillance of <i>Aedes japonicus japonicus</i> and <i>Ae. koreicus</i> in Italy</p>	<p>The invasive mosquito species, <i>Aedes koreicus</i>, and <i>Ae. japonicus japonicus</i> were detected in northeastern Italy for the first time in 2011 and 2015, respectively. Active monitoring has been carried out since their introduction to assess the spreading and occurrence of these species. The presence of invasive mosquitoes was checked in all possible breeding sites through collections of larvae. The mosquitoes were identified morphologically and molecularly. In 2022, <i>Ae. j. japonicus</i> was found in 12 out of 60 (20%) and <i>Ae. koreicus</i> in 36 out of 60 (60%) municipalities monitored. The latter was found in 14 municipalities negative the previous years. The mosquito was collected mainly in artificial containers located in small villages and in rural areas.</p>
<p>epidemiology, surveillance, risk assessment</p>	
<p>Title of activity</p>	<p>Scope</p>
<p>Surveillance of sand flies Phlebotomine for <i>Leishmania</i> and Toscana virus</p>	<p>In 2021, the first circulation of Toscana virus (TOSV) (Phlebovirus) was recorded in northeast Italy, with three human cases and one pool of positive vectors to TOSV found in the same area. In 2022 eight sites were monitored biweekly collecting sand flies by CDC-CO2 light traps and sticky traps. Insects were tested for TOSV and <i>Leishmania</i> screening. In total, 4243 sand flies were collected and 194 pools were tested; eight pool positive for <i>Leishmania infantum</i> and 1 for TOSV were found. Circulation of TOSV was confirmed also in 2022 with four human cases and detection of virus in vectors in the same circulation area of previous year.</p>
<p>epidemiology, surveillance, risk assessment</p>	
<p>Title of activity</p>	<p>Scope</p>
	<p>Parasitological analyses for <i>E. multilocularis</i> detection were performed on environmental fox faecal samples collected in</p>

Monitoring the focus of Echinococcus multilocularis in red fox	Alto Isarco district and Val d'Ultimo, resulting in two positive findings, corresponding to two individual foxes, both coming from Alto Isarco district; all samples collected in Val d'Ultimo turned out E. multilocularis negative. A manuscript including these results and the estimates of fox population abundance in the two sampling areas was submitted for publication in journal Pathogens_MDPI.
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epidemiology, surveillance, risk assessment

Title of activity	Scope
Monitoring the focus of Echinococcus multilocularis in small rodents	<p>In 2022, the Centre offered a diagnostic service for the search of Echinococcus multilocularis in small rodents (voles) on the area of competence. With collaboration of Museo delle Scienze di Bolzano, 84 dead voles were delivered to the IZSve Laboratory.</p> <p>At the necroscopy, liver was picked up and tested with multilocus PCR. Ten sampling tested positive (12%). Eight of the positive samples came from areas with a consistent and confirmed presence of Echinococcus multilocularis, another one coming from the Alta Val Venosta, was collected in an area where some historical positives were reported in the past but subsequently no longer confirmed and, finally, one came from an area so far deemed as Echinococcus multilocularis-free (Val Passiria).</p>

epidemiology, surveillance, risk assessment

Title of activity	Scope
Characterisation of West Nile viruses identified in the Veneto and Friuli Venezia Giulia regions (North-eastern Italy) in 2022	<p>In 2022, the majority of human cases of West Nile associated with neuroinvasive forms in Europe was recorded in the Veneto region, where a co-circulation of WNV lineage 1 (WNV-1) and WNV lineage 2 (WNV-2) has been observed since June 2022. In order to characterise the viruses circulating in the Veneto and Friuli Venezia Giulia regions, the complete or partial genome of 118 viruses (72 WNV-1 and 45 WNV-2) identified in pools of mosquitoes (N=33), birds (N=64), horses (N=1) and humans (N=16) between June and August 2022 was obtained. All samples were subjected to full WNV genome amplification protocols and sequenced using a Next Generation Sequencing (NGS) approach. WNV1 samples form a monophyletic group, with no genetic grouping according to species or province of origin, whereas WNV2 form two distinct clusters, one mostly circulating in the south-western of Veneto region and the second in the north-eastern part of Veneto and Friuli Venezia Giulia region.</p>

epidemiology, surveillance, risk assessment

Title of activity	Scope
	The genetic surveillance of SARS-CoV-2 has been implemented since the beginning of 2020 in order to provide insights into the evolutionary and epidemiological viral dynamics during the current COVID-19 pandemic in the Italian Northeastern region.

<p>Genetic surveillance of SARS-CoV-2 in Northeastern Italy</p>	<p>The complete genome sequences of about 7000 viruses of human origin have been sequenced between January and December 2022. All sequences obtained by Next Generation Sequencing are promptly shared in the GISAID database (www.gisaid.org/) and in the Italian National Institute of Health platform ICoGen (https://irida.iss.it/). The reporting period was characterised by the succession of Delta and Omicron variants in Veneto, both recognised by the WHO as Variants of Concern (VOC). In November 2021, the Delta variant was the only one detected in the Veneto region. As of February 2022, the Omicron variant reached a frequency of 100% in Veneto and has remained so until December 2022. During the reporting period, we have sequenced sporadic spillovers in animals. In particular, in March 2022, a virus identified in a cat was characterized. Natural human-to-pet SARS-CoV-2 transmission seems to be most commonly due to the close contact between pets and COVID-19 owners.</p>
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epidemiology, surveillance, risk assessment

Title of activity	Scope
<p>Harmonization of passive surveillance for coronaviruses in wildlife at a national level</p>	<p>We coordinated a surveillance program for coronaviruses in Italian wildlife, involving eight partners. All laboratories were harmonized in the target species/tissue and molecular protocol to be used. We selected species that were either i) associated with known coronaviruses (i.e. bats), ii) possibly associated with coronaviruses known in the domestic counterpart (i.e. wild canids infected by canine CoV), iii) at particular risk for the spillback of SARS-CoV-2 because of their susceptibility (i.e. mustelids and cervids) or synanthropic habits (i.e. red foxes). All partners used a pancoronavirus nested RT-PCR with good sensitivity for all known coronaviruses, including SARS-CoV-2. In order to trace all samples included in this surveillance, we developed an online tool shared among partners to record main features of each sample, including species, sex, age, coordinates, dates of sampling and test results (Italian Ministry of Health RCS01/20).</p>

Diagnosis, biotechnology and laboratory

Title of activity	Scope
<p>Detection of Trichinella spp. in domestic animals</p>	<p>Swine, equine and wild boars regularly slaughtered have been controlled for the presence of Trichinella larvae in muscle samples. All samples were negative.</p>

Diagnosis, biotechnology and laboratory

Title of activity	Scope
<p>Detection of Dermatophytes in domestic animals</p>	<p>2,087 skin specimens from pet and domestic animals have been tested for the presence of dermatophytes. Trichophyton mentagrophytes (n=4), Microsporum canis (n=10) and Nannizia</p>

	gypsea (ex <i>Microsporium gypseum</i>) were isolated from pet animals.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Diagnostic activity for <i>Coxiella burnetii</i>	We tested 4,151 ruminant sera, and 400 samples (i.e. aborted foetuses, tank milk) with real-time PCR. We organised the annual Proficiency testing for the diagnosis of Q fever by ELISA and Real Time PCR.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Diagnostic activity for <i>Leptospira</i>	We tested 1,503 farm animals' sera, 614 companion animals' sera, and 724 samples (i.e. urine, organs, blood, colture) with real-time PCR.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Diagnostic activity for Brucellosis	Local application of the national surveillance programme to confirm the official free status, by means of serology and abortion surveillance. We analysed 24,537 ruminant sera, 386 aborted foetuses and 1,585 bulk tank milk samples
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Development of a translational mouse model to assess Zika virus infection in healthy, immunocompetent women during the third trimester of pregnancy	We have studied the pathogenesis of this virus during the last stages of pregnancy and developed a model capable of simulating viral infection and disease in women in the second/third trimester of gestation. We used immunocompetent mice of the C57BL/6J strain, in which Zika infection, as in most susceptible people, runs asymptotically, and infected them after 12 days of gestation; this approach allowed us to ensure the completion of placental development by simulating what happens in women between the fifth and ninth months of pregnancy. Results obtained from biomolecular and immunohistochemical analyses conducted on tissues sampled from infected animals confirmed that the placenta is the target organ of viral replication at 6 days after maternal infection, while no evidence of vertical transmission from mother to foetus was found. Overall, these data support the validity of this model in representing Zika disease in a healthy woman during her last months of gestation, since this disease is mainly characterised by an asymptomatic or paucisymptomatic course in the mother, and associated with placental viral pathology rather than direct vertical transmission

	of the virus through this tissue.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Development and validation of serological tests for the detection of SARS-CoV-2 in susceptible animals	<p>By using sera originating from experimental (rabbit and hamster) and field (a fur mink farm that tested positive) sources, the Plaque Reduction Neutralisation Assay (PRNT) serological technique was validated using sera of animal origin, the gold standard method both to define the immunological profile of infected animals and quantify the presence of neutralising antibodies. This assay was further modified into a Focus Reduction Neutralisation Assay (FRNT) to reduce the time for achieving results. The changes to the assay became necessary following evidence of a reduced growth rate in the cell line used to perform the assays for the SARS-CoV-2 variants (BA.1, BA.2, BA.5). In 2022, the validation of serological methods was also extended to sera collected from wild ungulates.</p>
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Production of a panel of hyperimmune sera in different animal species against different variants of the SARS-CoV-2 virus.	<p>In order to study the antigenic correlation among different variants of SARS-CoV-2 and to produce reference materials for future validation studies of serological methods, hyperimmune sera were produced in ferrets (<i>Mustela putorius furo</i>) and hamsters (<i>Mesocricetus auratus</i>) for the the following variants: Parental (B.1), Beta, Delta, BA.1, BA.2, BA.5. All sera were produced by infecting the animals naturally (via the oro-nasal route); after a period of convalescence, the animals were subjected to terminal bloodletting to collect as much volume of serum as possible. The panel of sera was also shared with the Istituto Zooprofilattico Sperimentale della Lombardia e Emilia-Romagna (IZSLER) for the validation of an in-house ELISA kit to be used for the detection of antibodies against SARS-CoV-2.</p>
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Characterization of the Syrian hamster (<i>Mesocricetus auratus</i>) as an animal model to study the pathophysiology of SARS-CoV-2	<p>We performed a comprehensive characterization of the Syrian hamster (<i>Mesocricetus auratus</i>) as an animal model to study the pathophysiology of SARS-CoV-2. We used different approaches (description of clinical signs, viral replication, receptor profiling and host immune response) and targeted four organs (lungs, intestine, brain and PBMCs). Our data showed that hamsters are susceptible to the infection and develop a disease similar to COVID-19, including moderate to severe pulmonary lesions, inflammation and recruitment of the immune system in lungs and at systemic level. However, all animals recovered within 14 days without developing the severe pathology seen in humans.</p>
Diagnosis, biotechnology and laboratory	

Title of activity	Scope
<p>Characterization of a novel genus of coronavirus in mustelids from Italy</p>	<p>During the reporting period, we further characterized the novel CoV identified in the badger through next generation sequencing. Genetic and phylogenetic analyses confirmed the placement of the new Meles Coronavirus under a separate genus within the subfamily Orthocoronavirinae, which we named as Epsilon coronavirus. Indeed, the virus shares less than 46% mean amino acid identity and clusters separately from all the other genera so far described. At the level of the RNA dependent RNA polymerase, the virus clusters together with the sequence that we found in the pine marten, that is likely included within this new genus as well.</p>

Diagnosis, biotechnology and laboratory

Title of activity	Scope
<p>Rapid identification of ticks species and Borrelia spp from North-Eastern Italy.</p>	<p>In 2022, about 5000 ticks were collected by dragging, from wild animals retrieved by passive surveillance and from people accessing the Emergency Room of the Belluno Hospital. Ticks were screened for the presence of Borrelia using a Real time PCR and the positive ticks were incubated in BSK-H medium for cultivation. Multilocus sequence typing (MLST) based on eight housekeeping genes was performed for the positive Borrelia samples. Complete Sequence type (ST) was obtained for 16 infected ticks (8 from human patients and 8 from dragging). Each sample tested presented a different ST profile suggesting that there is a high genotypic heterogeneity of the strains circulating in the study area. Different reference strains of Borrelia and ticks collected both in the field and obtained from the Centers For Disease Control and Prevention (CDC) were used to create the reference spectra database for matrix-assisted laser desorption ionization-time of flight mass spectrometry identification (MALDI-TOF MS).</p>

Diagnosis, biotechnology and laboratory

Title of activity	Scope
<p>Comparing faecal examination results with necropsy findings in the monitoring of red fox intestinal helminths with zoonotic and</p>	<p>During 2021-22, in collaboration with the University of Padua, we investigated the fox intestinal helminths, focusing on the phylum Nematoda, in 150 carcasses of red fox, recovered in Bolzano province in the period 2019-2020. Nematodes were collected from the small intestine using a scraping and filtration technique and all parasites recovered were counted and identified. A copromicroscopic exam was carried out on fecal matter extracted from the same animals, and its results compared with scraping findings. Three nematode taxa were detected by intestinal scraping, i.e. Toxocara canis, Uncinaria stenocephala and Pterigodermatites affinis. A high number of false negative results at copromicroscopy confirms that a single examination may not be reliable, although the relative frequency of the two main nematodes in the overall population was similar with the two techniques. Copromicroscopy can</p>

	maintain therefore a role in the detection of parasites relevant for public health such as <i>T. canis</i> and <i>Ancylostomatidae</i> , whose presence was confirmed in the study area
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
BEYOND COVID by COVID PROJECT	Portal launched in April 2020 to bring together datasets and data sharing tools with the aim of accelerating research on SARS-COV-2. Allows researchers to upload, access and analyse data on COVID-19. The initiative is part of the BY-COVID project, a consortium of institutes and research facilities in the field of biomedical sciences funded by the European Union's Horizon 2020 programme, in which the Istituto Zooprofilattico Sperimentale delle Venezie (IZSve) also participates.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
EVAGlobal	Within the framework of the European research programme Horizon 2020 the project provides for development procedures and information tools in line with international standards, and began an intensive collaboration with the WOAHA Collaborating Centre for Veterinary Biologicals biobanks at the Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna (IZSLER). Recent IZSve initiatives consist in practical and theoretical proposal, including development and acquisition of IT tools for archiving biological samples; training in 'Access and Benefit Sharing'; participation in conferences, working groups and European networks on the subject of biobanking.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
ISIDORE: Integrated Services for Infectious Disease Outbreak Research	ISIDORE's main objective is to foster the interchange of resources between Europe's many research groups in order to make the scientific community's response to current and future epidemic emergencies synergistic. In pursuit of this mission, ISIDORE has established an extensive catalogue of products and services for which researchers can apply free of charge, complementing their research projects in the area of infectious diseases with epidemic potential.
Diagnosis, biotechnology and laboratory	
Title of activity	Scope
Diagnostic and research activities for Coronavirus in humans and animals	We screened domestic animals for antibodies against SARS-CoV-2, including 20 rabbits, 2,729 cows, 475 sheep and 347 goats. We also investigated the presence of coronaviruses in wildlife using a pan-coronavirus nested RT-PCR. In particular, we screened 617 individuals from 12 species, including 543 lung

and 544 intestine samples. Among these, 6 lungs and 5 intestines yielded positive results for species-specific coronaviruses, while none tested positive for SARS-CoV-2 (Italian Ministry of Health RCS01/20)

Zoonosis and Public Health

Title of activity	Scope
Zoonosis in dog and cat shelters: study and development of an integrated strategy for effective health management	To ensure the correct health and relational management of animals in shelters through training and communication actions, dogs and cats in shelters were screened for Influenza virus type A, Norovirus, Rotavirus, Cowpox virus, Reovirus, Hepatitis E virus, Dermatophytosis, <i>C. canimorsus</i> , intestinal parasites, antibiotic-resistant bacteria, <i>Bartonella henselae</i> , <i>Leishmania</i> , <i>Leptospira</i> , <i>Brucella canis</i> and SARS-CoV-2.

Zoonosis and Public Health

Title of activity	Scope
Development of a translational mouse model to assess the impact of dietary lipids on the metabolism and placental structure of pregnant women	Over these last years, the data collected on the vertical transmission of the Zika virus in pregnant women have highlighted the key role played by lipids in viral pathogenesis at the level of the placenta. The experiments conducted showed to what extent the lipids in the viral and cell membrane are able to influence the replication efficiency of Zika, favouring its internalisation and undressing within the cytoplasm of placental cells. Based on this reasoning, the question was raised as to whether the quality and quantity of lipids consumed in the diet during gestation may be able to redefine the structure of the trophoblast cell membrane, thus influencing viral pathogenesis in placental tissue. We validated a mouse model capable of simulating the gestation of healthy women with different dietary regimes in terms of their lipid profile. Our study confirms that a difference in the quantity and quality of fats administered during gestation can significantly affect the lipid composition of the placenta without altering the physiological metabolism.

Zoonosis and Public Health

Title of activity	Scope
The role of lipids and nutrition in Zika replication at placental level	There is a strong interconnection between cellular lipids and the pathogenesis of the Zika virus. To test if maternal diet could play a role in influencing the replication of this virus at placental level during the last months of pregnancy, we performed an in vivo study on a mouse model, which mimicked the condition of healthy women infected with the Zika virus in the last trimester of gestation. Results strengthen the assumption that the difference in dietary lipids during gestation influenced the lipid composition of the placenta and, consequently, its susceptibility to Zika infection. Integration of virology data with lipidomic analyses conducted on placentas of animals that had been fed with the experimental diets found a strong correlation between

	<p>the presence of placentas rich in phosphatidylserines (diet 4) and a high degree of resistance to viral infection. In conclusion, having outlined how fats in the maternal diet are able to modulate the lipid composition of the placenta, influencing its susceptibility to the Zika virus, lays the groundwork for a completely new approach towards this disease.</p>
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Zoonosis and Public Health

Title of activity	Scope
<p>Characterization of the interface between swine, people and bats</p>	<p>In order to evaluate the swine as potential host for emerging coronaviruses, including viruses spilling over from bats and humans we investigated 18 swine farms in northeaster Italy with different size and production features. We performed bioacoustic analyses to quantify and characterize the presence of bats within each farm. Data showed a wide range of activity (from 1.02 to 9.85 passages/hour) but were consistent in finding <i>Pipistrellus kuhlii</i> and <i>Hypsugo savii</i> as the main species. During inspection, we found evidence for bat roosting and environmental contamination with guano in two farms, both associated with the presence of <i>P. kuhlii</i>.</p>

Zoonosis and Public Health

Title of activity	Scope
<p>Characterization of coronaviruses circulating in pig farms in Italy</p>	<p>We investigated coronaviruses circulating in swine, using a pancoronavirus nested RT-PCR able to detect viruses from all known genera and showing a good sensitivity for the detection of SARS-CoV-2. Analyses were completed for 16/18 farms, including 840 individuals and 1680 samples in total. Among these, 7.5% turned out positive, with 92% showing the virus in the respiratory tract. All samples were characterized as PHEV or Alphacoronavirus 1, with sequencing of the S protein still to be performed to discriminate between TGE and PRCOV. We found the highest frequency of infection for PHEV, whose epidemiology is still largely unknown. No individual showed infection with unexpected or novel coronaviruses. These data confirm that SARS-CoV-2 is not circulating at a sustained level in investigated farms, thus suggesting low susceptibility of this host species to the pandemic virus.</p>

Zoonosis and Public Health

Title of activity	Scope
	<p>We investigated coronaviruses circulating in bats. We focused on <i>Pipistrellu kuhlii</i>, the most frequent species within pig farms. We collected faecal samples, coupling animal captures with environmental sampling below the roost. We investigated three populations, one located within a pig farm and the other two in private houses. Coronaviruses were found in all locations of two species within the genus Alphacoronavirus, both already described in the same host across Europe. The frequency of detection largely differed between populations and months of</p>

<p>Characterization of coronaviruses circulating in <i>Pipistrellus kuhlii</i> from Italy</p>	<p>sampling. Longitudinal analyses showed two peaks of prevalence in May and August that could be associated respectively with the aggregation of animals after wintering and the presence of new-born. These dynamics were particularly evident in the largest population and slightly differed in timing between roosts. Interestingly, in one group we also found a peak of prevalence in late June that was associated with the introduction of a different CoV species. These data suggest that the circulation of CoVs in bats is seasonal, but also highlight complex dynamics depending on population size, sex/age composition, environmental features and CoV strains involved.</p>
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Zoonosis and Public Health

Title of activity	Scope
<p>The role of stranded marine mammals in the human-animal interface</p>	<p>Cetaceans are informative sentinel species for monitoring ocean health. Among the best known pathogens we find Morbillivirus, Poxvirus, influenza virus, Calicivirus, West Nile virus, and, potentially, Coronavirus, Papillomavirus, Herpesvirus and Norovirus. Marine mammals are also susceptible to pathogenic bacteria, such as <i>Brucella</i> spp., some species of mycoplasmas and to parasites (in particular <i>Toxoplasma gondii</i>). We investigated viral diseases of major interest, such as influenza type A viruses with zoonotic potential, West Nile, animal coronaviruses, animal herpesviruses, Betanodaviruses, mammalian astroviruses (internal method) and SARS-CoV 2. The stranding events requiring our intervention were 25. During the reporting period, 245 analyses were performed on the samples submitted to our Institute.</p>

TOR3: HARMONISATION OF STANDARDS

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

Proposal title	Scope/Content	Applicable area

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

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose

National Reference Centre for Foreign Diseases of Animals	Teramo, Italy	Europe	Diagnosis confirmation
Aedes Invasive Mosquitoes Cost (AIM-COST)	Europe	Europe	Research project
VEO Action – Horizon 2020. Versatile Emerging infectious disease Observatory.	Europe	Europe	Research project
EYWA Project - Early Warning System for Mosquito-Borne Diseases and a game changer in the domain of epidemics.	Europe	Europe	Research project
National Reference Laboratory for Arboviruses. Department of Infectious Diseases. Istituto Superiore di Sanità	Rome, Italy	Europe	Research project
WOAH Reference Laboratory for Brucellosis	Teramo, Italy	Europe	Diagnosis confirmation, research projects, proficiency testing
National Reference Centre for Foreign Diseases of Animals	Teramo, Italy	Europe	Diagnosis confirmation
National Reference Centre for Leptospirosis	Brescia, Italy	Europe	Diagnosis confirmation, research projects, proficiency testing
National Reference Centre for Anthrax (Centro di Referenza Nazionale per l'Antrace (Ce.R.N.A.))	Foggia, Italy	Europe	Diagnosis confirmation, proficiency testing
Reference Laboratory for Swine Influenza	Parma, Italy	Europe	Diagnosis confirmation, proficiency testing

National Reference Centre for Leishmaniosis (C.RE.NA.L)	Sicily, Italy	Europe	Diagnosis confirmation, proficiency testing
National Centre for Foreign Animal Disease of the Canadian Food Inspection Agency (NCFAD)	Winnipeg (Canada)	Americas	Research studies focusing, among the others, on investigating zoonotic viral agents including animal influenza viruses

TOR4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOAHC 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
Medical Research Council University of Glasgow Centre for Virus Research - CVR (WHOCC Viral Genomics and Bioinformatics)	Glasgow (United Kingdom)	Americas Asia and Pasific Europe	WHOCC-ad hoc group on high throughput sequencing, Bioinformatics and computational Genomics (HTS-BCG)
Australian Animal Health Laboratory CSIRO Livestock Industries (WHOCC Laboratory Capacity Building)	Victoria (Australia)	Asia and Pasific	WHOCC-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 (WHOCC Veterinary Biologicals Biobank)	Brescia (Italy)	Americas Asia and Pasific Europe	WHOCC-ad hoc group on high throughput sequencing, Bioinformatics and computational Genomics (HTS-BCG)
Istituto Zooprofilattico Sperimentale del Lazio e della Toscana "M. Aleandri"	Italy	Europe	Surveillance activities for West Caucasian Bat Lyssavirus (WCBV) in the Tuscany region
Irish Equine Centre (IEC) (WHOCC RL for	Kildare (Ireland)	Americas Asia and Pasific	FAO-WHOCC Advisory Group on viral evolution of SARS-

equine influenza)		Europe	CoV-2 in animals
Royal Veterinary College (RVC) (WHOCC for Risk Analysis & Modelling)	London (UK)	Americas Asia and Pasific Europe	FAO-WHOA Advisory Group on viral evolution of SARS-CoV-2 in animals
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise (National Reference Centre for Whole Genome Sequencing of microbial pathogens: database and bioinformatic analysis)	Teramo (Italy)	Europe	Sequencing of the SARS-COV-2 genome in humans
Ospedale Sacro Cuore Don Calabria (IRCCS - Scientific Institute for Research, Hospitalization and Healthcare)	Verona (Italy)	Europe	SARS-COV-2 sequencing data and analysis support; Intra-host variation and evolutionary dynamics of SARS-CoV-2 in patients;
University of Liverpool	Liverpool (UK)	Europe	Research collaboration for diagnostic and scientific purposes on animal and human viral agents
Val d'Hebron University Hospital (Spain) ZIKAction, Horizon2020 - Grant Agreement 734857 of the EU Commission DG for research and innovation	Coordinator: INSERM (France)	Africa Americas Asia and Pasific Europe	Interdisciplinary programme of research studies to address key knowledge gaps related to ZIKA epidemiology, natural history and pathogenesis, focusing on maternal and child health
IVO De Carneri Tanzania Zanzibar	Tanzania Zanzibar	Africa	Providing support for public health programs in the area, one of the world's most affected by parasitic and infectious diseases
University of Padua	Padova, Italy	Europe	Cell shielding to REduce Sars-cov sPreading intO humaN boDy (RESPOND)
University of Padua	Padova, Italy	Europe	Resource recovery from recycling of personal protective items (PPI)

Department of Medicine DIMED (University of Padua)	Padova, Italy	Europe	Resource recovery from recycling of personal protective items (PPI)
University of Venice	Venice, Italy	Europe	In vitro studies in a BSL3 confined environment aimed at testing the efficacy of an experimental drug against SARS-CoV-2 In vivo studies in the Sprague-Dawley animal model and in the ferret
Global Laboratory Leadership Programme (GLLP) FAO-WHOAH -WHO; The Association of Public Health Laboratories (APHL); The Centers for Disease Control and Prevention (CDC); The European Centre for Disease Prevention and Control (ECDC)	worldwide	Africa Americas Asia and Pasific Europe MiddleEast	To outline the essential competencies needed by laboratory leaders to build and direct sustainable national laboratory systems for disease detection, control and prevention. To ensure a multisectoral One Health approach addressing the entire laboratory system that includes human, animal, environmental, agricultural, food, aquatic and chemical laboratories in support of health systems.
FAO and IAEA Centre of Nuclear Techniques in Food and Agriculture	Italy, Austria	Europe	To generate, validate, standardize and make available reference material for the antigenic surveillance in animals of circulating and newly emerging strains of SARS-CoV-2
PRIMA CALL – Medirab	Spain, Tunisia, Morocco, Italy	Africa Europe	Strategies for the control of Lyssaviruses in North African Mediterranean countries and the prevention of importation into Europe.
BIO-CRIME Interreg VA Italy-Austria	Austria, Italy	Europe	Implementation of joint actions and policy exchanges to fight against zoonoses and illegal pet trade
			Organisation and implementation of training activities on controls of

CHAFAEA/2016/BTSF/03 "Better training for Safer Food"	Europe	Europe	movements of dogs and cats: i.e. intra-Union trade, imports and non-commercial movements
ConVErgence Assessing swine as potential hosts for emerging Coronaviruses - Era-Net ICRAD	Italy, The Netherlands, United Kingdom	Europe	Investigating the process of the emergence of coronaviruses in the pig industry, focusing on bats and humans as the most likely sources of infection
H2020 "VERDI" SARS-coV2 variants Evaluation in pRegnancy and paeDiatrics cohorts	Europe, Switzerland, United Kingdom, South Africa, Thailand, Haiti, USA	Africa Americas Asia and Pasific Europe MiddleEast	Improving the understanding of the epidemiology, transmission, disease progression and treatment of variants of SARS-CoV-2 among children and pregnant women
H2020 "ORCHESTRA"	Europe India Brazil Argentina Gabon Congo	Africa Americas Europe	Connecting European Cohorts to Increase Common and Effective Response to SARS-CoV-2 Pandemic
BeYond-COVID (BY-COVID)	worldwide	Africa Americas Asia and Pasific Europe MiddleEast	Worldwide Providing comprehensive open data on SARS-CoV-2 and other infectious diseases across scientific, medical, public health and policy domains.

TOR6: EXPERT CONSULTANTS

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

No

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

No

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

Yes

a) Technical visit : 6

b) Seminars : 0

c) Hands-on training courses: 1

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
A	SARS-CoV-2 and Coronaviruses	ITALY	1
A	Chiroptera and their habits	ITALY	2
A	SARS-CoV-2 and ZIKA virus	FRANCE	2
A	Sampling activities on bats and swine	UK	1
C	SARS-CoV-2, ZIKA: handling hamsters, mice, ferrets and other uninfected animals; management of laboratory animals; basic statistics, preparation of ministerial annexes aimed at the approval of animal experiments.	ITALY	1
D	Thesis on coronaviruses affecting Italian wildlife (within a research funded by the Italian Ministry of Health)	ITALY	1

TOR8: SCIENTIFIC MEETINGS

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

No

TOR9: DATA AND INFORMATION DISSEMINATION

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

a) Articles published in peer-reviewed journals:

41

1. Albanese F, Muscatello LV, Michelutti A, Falcaro C, Bellentani L, Danesi P. Canine eumycetoma caused by *Madurella pseudomycetomatis*. *Med Mycol Case Rep*. 2022 Feb 1;35:51-53.
2. Arnoldi I, Negri A, Soresinetti L, Brambilla M, Carraretto D, Montarsi F, Roberto P, Mosca A, Rubolini D, Bandi C, Epis S, Gabrieli P. Assessing the distribution of invasive Asian mosquitoes in Northern Italy and modelling the potential spread of *Aedes koreicus* in Europe. *Acta Trop*. 2022 Aug;232:106536.
3. Audino, T, Berrone, E, Grattarola, C., Giorda, F., Mattioda, V., Martelli, W., et al. (2022). Potential SARS-CoV-2 susceptibility of cetaceans stranded along the Italian coastline. *Pathogens*, 11(10) <https://doi.org/10.3390/pathogens11101096>
4. Balboni A, Mazzotta E, Boniotti MB, Bertasio C, Bellinati L, Lucchese L, Battilani M, Ceglie L, Marchione S, Esposito G, Natale A. Outbreak of *Leptospira borgpetersenii* Serogroup Sejroe Infection in Kennel: The Role of Dogs as Sentinel in Specific Environments. *Int J Environ Res Public Health*. 2022 Mar 25;19(7):3906.
5. Barzon L, Montarsi F, Quaranta E, Monne I, Pacenti M, Michelutti A, Toniolo F, Danesi P, Marchetti G, Gobbo F, Sinigaglia A, Riccetti S, Dal Molin E, Favero L, Russo F, Capelli G. Early start of seasonal transmission and co-circulation of West Nile virus lineage 2 and a newly introduced lineage 1 strain, northern Italy, June 2022. *Euro Surveill*. 2022 Jul;27(29):2200548.
6. Barzon L, Pacenti M, Montarsi F, Fornasiero D, Gobbo F, Quaranta E, Monne I, Fusaro A, Volpe A, Sinigaglia A, Riccetti S, Molin ED, Satto S, Lisi V, Gobbi F, Galante S, Feltrin G, Valeriano V, Favero L, Russo F, Mazzucato M, Bortolami A, Mulatti P, Terregino C, Capelli G. Rapid spread of a new West Nile virus lineage 1 associated with increased risk of neuroinvasive disease during a large outbreak in northern Italy, 2022: One Health analysis. *J Travel Med*. 2022 Nov 4:taac125.
7. Bellinati L, Pesaro S, Marcer F, Danesi P, Natale A, Ceglie L. Detection of a Novel *Chlamydia* Species in Invasive Turtles. *Animals (Basel)*. 2022 Mar 20;12(6):784.
8. Bellinati L, Campalto M, Mazzotta E, Ceglie L, Cavicchio L, Mion M, Lucchese L, Salomoni A, Alessio Bortolami A, Quaranta E, Magarotto J, Favarato M, Squarzon L, Natale A. One year surveillance of SARS-CoV-2 exposure in stray cats and kennel dogs from Northeastern Italy. *Microorganism*. 2023; 11(1):110.
9. Berlanda M, Valente C, Guglielmini C, Danesi P, Contiero B, Poser H. Malassezia overgrowth in dogs in northern Italy: frequency, body distribution, clinical signs and effects of pharmacologic treatments. *Vet Ital*. 2022 Nov 18;58(1):103-109.
10. Bertola M, Mazzucato M, Pombi M, Montarsi F. Updated occurrence and bionomics of potential malaria vectors in Europe: a systematic review (2000–2021). *Parasit Vectors*. 2022; 15:88.
11. Bertola M, Fornasiero D, Sgubin S, Mazzon L, Pombi M, Montarsi F. "Comparative efficacy of BG-Sentinel 2 and CDC-like mosquito traps for monitoring potential malaria vectors in Europe". *Parasit Vectors*. 2022 15:160.
12. Brian, I., Manuzzi, A., Dalla Rovere, G., Giussani, E., Palumbo, E., Fusaro, A., Bonfante, F., Bortolami, A., Quaranta, E.G., Monne, I., Patarnello, T., Bargelloni, L., Terregino, C., Holmes, E.C., Todesco, G., Sorrentino, F., Berton, A., Badetti, C., Carrer, C., Ferrari, G., Zincone, C., Milan, M., & Panzarin, V. (2022). Molecular Monitoring of SARS-CoV-2 in Different Sewage Plants in Venice and the Implications for Genetic Surveillance. *ACS EST Water*.
13. Cocchi, M., Danesi, P., De Zan, G., Leati, M., Gagliazzo, L., Ruggeri, M., Palei, M., Bremini, A., Rossmann, M., Lippert-Petscharnig, M., Mansfeld, M., Deotto, S., Leardini, S., Gobbo, F., Zucca, P., & De Benedictis, P. (2021). A Three-Year Biocrime Sanitary Surveillance on Illegally Imported Companion Animals. *10 Pathogens*, doi:10.3390/pathogens10081047
14. Colitti, B., Bonfante, F., Grazioli, S., Anfossi, L., Nogarol, C., Scalas, D., Bertolotti, L., Bortolami, A., Pagliari, M., Pezzoni, G., Moreno, A., Lelli, D., Gennero, M.S., Dondo, A., Brocchi, E., & Rosati, S. (2022). Detailed epitope mapping of SARS-CoV-2 nucleoprotein reveals specific immunoresponse in cats and dogs housed with COVID-19 patients. *Research in veterinary science*, 143, 81-87.
15. Colitti, B., Manassero, L., Colombino, E., Ferraris, E.I., Caccamo, R., Bertolotti, L., Bortolami, A., Bonfante, F., Papa, V., Cenacchi, G., Calabrese, F., Bozzetta, E., Varello, K., Capucchio, M.T., & Rosati, S. (2022). Pulmonary fibrosis in a dog as a sequela of infection with Severe Acute Respiratory Syndrome Coronavirus 2? A case report. *BMC Veterinary Research*, 18, 111.
16. Danesi P, Petini M, Falcaro C, Bertola M, Mazzotta E, Furlanello T, Krockenberger M, Malik R. *Pneumocystis* Colonization in Dogs Is as in Humans. *Int J Environ Res Public Health*. 2022 Mar 8;19(6):3192.
17. Da Re D, Van Bortel W, Reuss F, Müller R, Boyer S, Montarsi F, Ciocchetta S, Arnoldi D, Marini G, Rizzoli A, L'Ambert G, Lacour G, Koenraadt CJM, Vanwambeke SO, Marcantonio M. dynamAedes: a unified modelling framework for invasive *Aedes* mosquitoes. *Parasit Vectors*. 2022 Nov 8;15(1):414.
18. Da Rold, G.; Obber, F.; Monne, I.; Milani, A.; Ravagnan, S.; Toniolo, F.; Sgubin, S.; Zamperin, G.; Foiani, G.; Vascellari, M.; et al. Clinical Tick-Borne Encephalitis in a Roe Deer (*Capreolus capreolus* L.). *Viruses* 2022, 14, 300. <https://doi.org/10.3390/v14020300>
19. Damiani C, Cappelli A, Comandatore F, Montarsi F, Serrao A, Michelutti A, Bertola M, Mancini MV, Ricci I, Bandi C, Favia G. "Wolbachia in *Aedes koreicus*: Rare Detections and Possible Implications". *Insects* 2022, 13, 216.
20. Di Chiara, C., Cantarutti, A., Costenaro, P., Dona, D., Bonfante, F., Cosma, C., Ferrarese, M., Cozzani, S., Petrara, M.R., Carmona, F., Liberati, C., Palma, P., Di Salvo, G., De Rossi, A., Plebani, M., Padoan, A., & Giaquinto, C. (2022). Long-term Immune Response to SARS-CoV-2 Infection Among Children and Adults After Mild Infection. 5, e2221616. *JAMA network open*, Jul 1

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21. Galosi L, Falcaro C, Danesi P, Zanardello C, Berardi S, Biagini L, Attili AR, Rossi G. Atypical Mycosis in Psittacine Birds: A Retrospective Study. *Front Vet Sci.* 2022 May 12;9:883276.
22. Gradoni L, Ferroglio E, Zanet S, Mignone W, Venco L, Bongiorno G, Fiorentino E, Cassini R, Grillini M, Simonato G, Michelutti A, Montarsi F, Natale A, Gizzarelli M, Foglia Manzillo V, Solari Basano F, Nazzari R, Melideo O, Gatti D, Oliva G. Monitoring and detection of new endemic foci of canine leishmaniosis in northern continental Italy: An update from a study involving five regions (2018–2019). *Vet Parasitol Reg Stud Reports.* 2022 Jan;27:100676.
23. Grassi, L., Menandro, M., Obber, F., Drigo, M., Legnardi, M., Pasotto, D., Tucciarone, C.M., Faustini, G., Citterio, C., Cecchinato, M., Franzo, G.; Investigation of Carnivore protoparvovirus 1 and Amdoparvovirus infections in red fox populations of the Italian Dolomites. *Veterinary Research Communications* 2022. <https://doi.org/10.1007/s11259-022-09965-w>
24. Leopardi, S., Drzewnioková, P., Baggieri, M.; Marchi, A.; Bucci, P.; Bregoli, M.; De Benedictis, P.; Gobbo, F.; Bellinati, L.; Citterio, C.V.; Monne, I.; Pastori, A.; Zamperin, G.; Palumbo, E.; Festa, F.; Castellani, M.; Zorzan, M.; D'Ugo, E.; Zucca, P.; Terregino, C.; Magurano, F. - Identification of Dobrava virus in *Apodemus flavicollis* from North Eastern Italy during enhanced mortality. *Viruses.* (2022) 14 (6) 1241. <https://doi.org/10.3390/v14061241>
25. Kurucz K, Zeghib S, Arnoldi D, Marini G, Manica M, Michelutti A, Montarsi F, Deblauwe I, Van Bortel W, Smits N, Pfitzner WP, Czajka C, Jöst A, Kalan K, Šušnjar J, Ivović V, Kuczmog A, Lanszki Z, Tóth GE, Somogyi BA, Herczeg R, Urbán P, Bueno-Marí R, Soltész Z, Kemenesi G. *Aedes koreicus*, a vector on the rise: Pan-European genetic patterns, mitochondrial and draft genome sequencing. *PLoS One.* 2022 Aug 1;17(8):e0269880.
26. Mazzotta E, De Zan G, Cocchi M, Boniotti MB, Bertasio C, Furlanello T, Lucchese L, Ceglie L, Bellinati L, Natale A. Feline Susceptibility to Leptospirosis and Presence of Immunosuppressive Co-Morbidities: First European Report of *L. interrogans* Serogroup Australis Sequence Type 24 in a Cat and Survey of *Leptospira* Exposure in Outdoor Cats. *Trop. Med. Infect. Dis.* 2023; 8(1):54.
27. Mazzotta E, Foiani G, De Benedictis GM, Fiore E, Natale A, Spagnolo E, Vascellari M, Cento G, Corrà M. Salmonella Enteritidis Fatal Septicemia with Meningoencephalitis in a Tiger (*Panthera tigris*) Cub. *Animals (Basel).* 2022 Sep 20;12(19):2490.
28. Mazzaferri, F., Mirandola, M., Savoldi, A., De Nardo, P., Morra, M., Tebon, M., Armellini, M., De Luca, G., Calandrino, L., Sasset, L., D'Elia, D., Sozio, E., Danese, E., Gibellini, D., Monne, I., Scroccaro, G., Magrini, N., Cattelan, A., Tascini, C., & Tacconelli, E. (2022). Exploratory data on the clinical efficacy of monoclonal antibodies against SARS-CoV-2 Omicron Variant of Concern. *medRxiv, Cold Spring Harbor Laboratory Press* doi:10.1101/2022.05.06.22274613
29. Mazzotta E, Lucchese L, Salata C, Furlanello T, Baroni E, Zotti A, Venturi G, Fincato A, Marchione S, Capello K, Natale A. Are Small Animal Practitioners Occupationally Exposed to Leptospirosis? Results of a Serological Survey. *Int J Environ Res Public Health.* 2022 Feb 4;19(3):1797.
30. Menegon F, Capello K, Tarakdjian J, Pasqualin D, Cunial G, Andreatta S, Dellamaria D, Manca G, Farina G, Di Martino G. – (2022) - Antibiotic Use in Alpine Dairy Farms and Its Relation to Biosecurity and Animal Welfare – *Antibiotics* 2022, 11(2): 231 <https://doi.org/10.3390/antibiotics11020231>
31. Montarsi F, Rosso F, Arnoldi D, Ravagnan S, Marini G, Delucchi L, Rosà R, Rizzoli A. First report of the blood-feeding pattern in *Aedes koreicus*, a new invasive species in Europe. *Sci Rep.* 2022 Sep 21;12(1):15751.
32. Natale A, Mazzotta E, Mason N, Ceglie L, Mion M, Stefani A, Fincato A, Bonfante F, Bortolami A, Monne I, Bellinati L, Guadagno C, Quaranta E, Pastori A, Terregino C. SARS-Cov-2 Natural Infection in a Symptomatic Cat: Diagnostic, Clinical and Medical Management in a One Health Vision. *Animals (Basel).* 2021 Jun 1;11(6):1640.
33. Obber F, Celva R, Da Rold G, Trevisiol K, Ravagnan S, Danesi P, Cenni L, Rossi C, Bonato P, Capello K, Hauffe HC, Massolo A, Cassini R, Benvenuti V, Agreiter A, Righetti D, Ianniello M, Dellamaria D, Capelli G, Citterio CV. A highly endemic area of *Echinococcus multilocularis* identified through a comparative re-assessment of prevalence in the red fox (*Vulpes vulpes*), Alto Adige (Italy: 2019–2020). *PLoS One.* 2022 May 5;17(5):e0268045.
34. Obber, F.; Celva, R.; Libanora, M.; Da Rold, G.; Dellamaria, D.; Partel, P.; Ferraro, E.; Calabrese, M.S.; Morpurgo, L.; Pisano, S.R.R.; Citterio, C.V.; Cassini, R. Description of a sarcoptic mange outbreak in Alpine chamois using an intensive surveillance approach. *Animals*(2022)12, 2077. <https://doi.org/10.3390/ani12162077>
35. Orlandi M, Giglia G, Danesi P, Laricchiuta P, Abramo F. *Eumycetoma* Caused by *Madurella pseudomycetomatis* in a Captive Tiger (*Panthera tigris*). *J Fungi (Basel).* 2022 Dec 9;8(12):1289.
36. Padoan, A., Cosma, C., Bonfante, F., Della Rocca, F., Barbaro, F., Santarossa, C., Dall'Olmo, L., Pagliari, M., Bortolami, A., Cattelan, A., Cianci, V., Basso, D., & Plebani, M. (2021). Neutralizing antibody titers six months after Comirnaty vaccination: kinetics and comparison with SARS-CoV-2 immunoassays. 60, 456–463. *Clinical chemistry and laboratory medicine*, Andrea Padoan et al., published by De Gruyter, Berlin/Boston Dec 16 doi:10.1515/cclm-2021-1247 [doi]
37. Pagliari, M., Mazzetto, E., Gastaldelli, M., Bortolami, A., Donà, D., Padoan, A., Di Chiara, C., Pezzani, M.D., Cosma, C., Napolitan, A.,

Quaranta, E.G., Giussani, E., Fusaro, A., Pascarella, M., Aita, A., Liberati, C., Lorusso, A., Monne, I., De Rossi, A., Basso, D., Porru, S., Ricci, A., Terregino, C., Plebani, M., Tacconelli, E., Giaquinto, C., & Bonfante, F. (2022). Omicron Neutralizing and Anti-SARS-CoV-2 S-RBD Antibodies in Naïve and Convalescent Populations After Homologous and Heterologous Boosting With an mRNA Vaccine. [Epub ahead of print]

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39. Riccardo F, Bella A, Monaco F, Ferraro F, Petrone D, Mateo-Urdiales A, Andrianou XD, Del Manso M, Venturi G, Fortuna C, Di Luca M, Severini F, Caporali MG, Morelli D, Iapaolo F, Pati I, Lombardini L, Bakonyi T, Alexandra O, Pezzotti P, Perrotta MG, Maraglino F, Rezza G, Palamara AT; Italian Arbovirus Surveillance network. Rapid increase in neuroinvasive West Nile virus infections in humans, Italy, July 2022. *Euro Surveill.* 2022 Sep;27(36).

40. Stefanelli, P., Trentini, F., Petrone, D., Mammone, A., Ambrosio, L., Manica, M., Guzzetta, G., d'Andrea, V., Marziano, V., Zardini, A., Molina Grane, C., Ajelli, M., Di Martino, A., Riccardo, F., Bella, A., Sane Schepisi, M., Maraglino, F., Poletti, P., Palamara, A.T., Brusaferrero, S., Rezza, G., Pezzotti, P., Merler, S., Genomic SARS-CoV-2 National Surveillance Working Group, Italian Integrated Surveillance of COVID-19 Study Group, Italian Integrated Surveillance of COVID-19 Study Group, & Genomic SARS-CoV-2 National Surveillance Working Group. (2022). Tracking the progressive spread of the SARS-CoV-2 Omicron variant in Italy, December 2021 to January 2022. 27, 10.2807/1560-7917.ES.2022.27.45.2200125. *Euro surveillance : bulletin Europeen sur les maladies transmissibles = European communicable disease bulletin*, Nov doi:10.2807/1560-7917.ES.2022.27.45.2200125 [doi]

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b) International conferences:

10

1. Bellinati L., Ceglie L., Mazzotta E., Sandonà C., Campalto M., Lucchese L., Natale A. (2022) Preliminary data from a serological and molecular survey of Hepatitis E virus in stray cats and dogs in North-East Italy. 12th International Congress For Veterinary Virology (ESVV). p. 73, Ghent, Belgium, 20-23rd September, 2022.

2. Bertola M. Entomological diagnosis in WNV/USUV surveillance. Review and evaluation of the public health and animal health aspects of West Nile virus and Usutu virus infections in the European Union. ECDC-EFSA_IZSve virtual meeting – 18-19/02/2022.

3. Bertola M. WNV and USUV: Main survey results in EE/EEA - results in vectors. Review and evaluation of the public health and animal health aspects of West Nile virus and Usutu virus infections in the European Union. ECDC-EFSA_IZSve virtual meeting – 25/02/2022.

4. Bertola M., Gradoni F., Toniolo F., Da Rold G., Porcellato E., Montarsi F. Tick-borne pathogens detected in ticks removed from animal hosts in northeastern Italy. 10th Tick and Tick Borne Pathogen Conference. Murighiol, Romania – 29/08-02/09 2022.

5. Campalto M., Monica Mion M., Mazzotta E., Cavicchio L., Carrino M., Ceglie L., Beato M.S., Natale A. (2022). Preliminary Data on Potential Zoonotic Viruses in Cats in North East Italy: Mammalian Orthoreovirus and Rotavirus. 12th International Congress For Veterinary Virology (ESVV). p. 86, Ghent, Belgium, 20-23rd September, 2022

6. Danesi Patrizia: Animals as sentinels for environmental fungal pathogens. The last word belongs to the microbes. Celebrating the 200th anniversary of the birth of Louis Pasteur conference. Warsaw, Poland – 29-30 november 2022.

7. Fiore E., Lisuzzo A., Beltrame A., Di Sandro P., Contiero B., Giancesella M., Schiavon E., Pisoni G., Tessari R., Morgante M., Mazzotta E. (2022). Lung ultrasonography and clinical follow-up evaluations in fattening bulls affected by Bovine Respiratory Disease (BRD) during restocking period and after Tulathromycin and Ketoprofen treatment. In: Proceeding of the 31th World Buiatrics Congress. p. 71-72, Madrid, Spagna, 4-8th September 2022.

8. Mazzotta E., Sacchini F., De Massis F., Tittarelli M., Brunetta R., Varotto S., Busa A., Selli L., Natale A. (2022). *Brucella canis* serological survey in kennel dogs in North of Italy: case reports and preliminary data. In Proceedings of the Brucellosis 2022 International Conference, including the 74th Annual Brucellosis Research Conference. p. 115, Giulianova Teramo, Italia, 15-19th September 2022.

9. Mazzotta E., Sacchini F., De Massis F., Tittarelli M., Brunetta R., Varotto S., Busa A., Selli L., Natale A. (2022). *Brucella canis* serological survey in kennel dogs in North of Italy: case reports and preliminary data. In Proceedings of the Brucellosis 2022 International Conference, including the 74th Annual Brucellosis Research Conference. p. 115, Giulianova Teramo, Italia, 15-19th September 2022.

10. Spagnolo E., Corrà M., Campalto M., Dall'Ava B., Carrino M., Mazzotta E., Natale A. (2022). Survey on the presence of

Capnocytophaga canimorsus in dogs and cats of Northeastern Italy: preliminary data. *MedVetPathogens. Prato, Italia, 3-6th October 2022.*

c) National conferences:

39

1. Audino, T., Berrone, E., Grattarola, C., Giorda, F., Mattioda, V., Pintore, A., Terracciano, G., Cocumelli, C., Lucifora, G., Di Nocera, F., Di Francesco, G., Rubini, S., Gavaudan, S., Toffan, A., Mazzariol, S., Petrella, A., Di Guardo, G., Caramelli, M. & Casalone, C. (2022). SARS-CoV-2 in marine mammals: survey results on the potential viral susceptibility in cetaceans stranded along the Italian coastline. *presentazione orale, 33rd Conference of the European Cetacean Society, 05-07 April 2022, Ashdod, Israel*
2. Balboni A., Mazzotta E., Boniotti MB., Bertasio C., Bellinati L., Lucchese L., Battilani M., Ceglie L., Marchione S., Esposito G., Natale A. (2022). Outbreak of *Leptospira borgpetersenii* serogroup Sejroe infection in kennel dogs. In: *Proceeding Atti di Convegno: 75° Convegno Nazionale Società Italiana Delle Scienze Veterinarie S.I.S. VET. Lodi (MI), Italy, 15-18th June 2022.*
3. Belfanti I., Ceglie L., Cavicchio L., Alvino M.V., Zecchin G., Prezioso S. Genetic variability of the N gene of bovine Coronavirus isolates circulating in Northern Italy. (2022). *14th Annual meeting EPIZONE. p. 189-190, Barcelona, Spain, 18-20th May 2022.*
4. Bertola M, Montarsi F, Mazzucato M, Ferrè N, Lucchese L, Mazzotta E, Obber F, Salvati MV, Salata C, Tomao P, Mughini Gras L, Vonesch N, Di Martino G. Development of an integrated geo-epidemiological system for the assessment of occupational risk of tick-borne pathogens. *Atti del XXXII Congresso SolPa. Pag. 314*
5. Bertola M, Gradoni F, Toniolo F, Sgubin S, Da Rold G, Porcellato E, Montarsi F Ticks, Tick-borne pathogens and host reservoirs in northeastern Italy. *Atti del XXXII Congresso SolPa. Pag 239*
6. Bongiorno G, Bianchi R, Bernardini I, Fiorentino E, Scalone A, Fortuna C, Orsini, Foxy C, Magliano A, Del Iesto I, Michelutti A, Calzolari M, Mosca A, Montarsi F, De Liberato C, Venturi G, Di Muccio T, Dottori M, Satta G, Gradoni L, Angelini P. Longitudinal study of sand fly cohorts from seven Italian Regions and molecular detection of Phlebotomine-Borne Diseases as baseline for risk-map implementation. *Atti del XXXII Congresso SolPa. Pag 238*
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<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-08/2022-08-09-repubblica.pdf>

Montarsi F (7 Gold Padova, 03/08/2022)

<https://www.7goldtelepadova.tv/archivio-tg7-nord-est/>

Montarsi F (Local Team, 04/08/2022)

<https://www.localteam.it/video/il-virus-west-nile-intervista-allesperto>

Montarsi F (Gazzettino, 04/08/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-08/2022-08-04-gazzettino.pdf>

Capelli G (RAI3 - TGR FVG, 08/08/2022)

<https://www.rainews.it/tgr/fvg/video/2022/08/fvg-west-nile-caso-sospetto-analisi-2841a5df-d287-4460-9cfd-186c1b0d1538.html>

Montarsi F (Telenuovo, 23/08/2022)

<https://tgp Padova.telenuovo.it/attualita/2022/08/23/west-nile-la-siccita-ne-incrementa-la-diffusione-video>

Montarsi F (Corriere Veneto, 25/08/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-08/2022-08-25-corriere-veneto.pdf>

Montarsi F (Gazzettino, 28/08/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-08/2022-08-28-gazzettino-padova.pdf>

Citterio C, Mascarello G (Corriere Alpi, 01/09/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-09/2022-09-01-corriere-alpi.pdf>

Montarsi F (Vvox, 12/09/2022)

https://www.youtube.com/watch?v=x_7W7zTA-L0

Montarsi F (Antenna 3 - TNE, 13/09/2022)

<https://www.youtube.com/watch?v=VQPrLZN5lls>

Montarsi F (Corriere Veneto, 06/10/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-10/2022-10-06-corriere-veneto.pdf>

Montarsi F (Repubblica, 25/10/2022)

<https://www.izsvenezie.it/documenti/comunicazione/area-stampa/rassegna-stampa/2022/2022-10/2022-10-25-repubblica.pdf>

Links

NRL and WHOA Collaborating Centre for diseases at the Animal/Human Interface (IZSVE)

<http://www.izsvenezie.com/reference-laboratories/diseases-at-the-animalhuman-interface/>

IZSVE, Next Generation Sequencing (NGS): SARS-CoV-2

<https://www.izsvenezie.com/new-data-duration-immune-protection-against-sars-cov-2-children/>

DGRV 1424/2020 Veneto Region project: sequencing of SARS-CoV-2 (Italian)

<https://www.izsvenezie.it/categoria/covid-19/>

IZSVE's section on bats (Italian)

<https://www.izsvenezie.it/temi/animali/pipistrelli/>

IZSVE's section on fish, crustacean and mollusc pathology

<https://www.izsvenezie.com/reference-laboratories/fish-crustacean-and-mollusc-pathology/>

ZikAction - Preparedness, research and action network on maternal-paediatric axis of Zika virus infection in Latin America and the Caribbean

<https://www.izsvenezie.it/zikaction-pediatri-veterinari-epidemiologi-lotta-virus-zika/>

<https://zikaction.org/>

Interreg V A Italy-Austria "BIO CRIME"

<https://www.izsvenezie.com/fighting-against-zoonoses-illegal-pet-trade-biocrime-project/>

<http://www.biocrime.org/>

EU-EFSA The European Union One Health 2021 Zoonoses Report

<https://www.izsvenezie.it/rapporto-zoonosi-ue-efsa-ecdc-2021/>

<https://www.efsa.europa.eu/en/efsajournal/pub/6971>

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

At the RC the third-generation sequencing technology MinION Nanopore was implemented for viral characterisation. Furthermore we are now equipped with a tool for automation of NGS Hamilton library preparation.

12. Additional comments regarding your report: