WOAH Collaborative Centre Reports Activities 2022

Activities in 2022

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Centre Information

Title of WOAH Collaborating Centre	WOAH Collaborating Centre for Epidemiology, modelling and surveillance
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Name of the writer:	Paolo Calistri

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 WOAH

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
	Following the Sub-Grant Agreement between WOAH and IZS-Teramo, signed on April 2022, a project titled "Defining Ecoregions and Prototyping

Defining Ecoregions and Prototyping on EO-based Vector-borne Disease Surveillance System for North Africa (PROVNA)	on EO-based Vector-borne Disease Surveillance System for North Africa (PROVNA)" started with the general objective of supporting the competent authorities in North Africa for the identification of specific areas on which carrying out entomological/serological surveillance for vector-borne diseases (VBD) through the definition of "eco-regions" characterised by higher suitability for VBD transmission.

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Analytical web-tool for the prediction of WNV circulation	Based on Earth Observation satellite data (Land Surface Temperature, Normalized Difference Vegetation Index and Surface Soil Moisture) and historical WNV surveillance data, through the application of machine leaning approaches, a model for the prediction of WNV circulation has been developed (https://mapserver.izs.it/gis_wn_predictions). This model is able to predict 20-days in advance the WNV circulation in Italy with a spatial resolution of 250 meters and a temporal precision of 16 days. On the basis of this model an interactive and continuously updated web dashboard has been developed (http://mapserver.izs.it/gis_wn_predictions/#) Ref: Candeloro, L.; Ippoliti, C.; Iapaolo, F.; Monaco, F.; Morelli, D.; Cuccu, R.; Fronte, P.; Calderara, S.; Vincenzi, S.; Porrello, A.; D'Alterio, N.; Calistri, P.; Conte, A. Predicting WNV Circulation in Italy Using Earth Observation Data and Extreme Gradient Boosting Model. Remote Sens. 2020, 12(18), 3064; https://doi.org/10.3390/rs12183064.

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
T-Racing: a contact tracing tool for supporting epidemiological investigation during livestock disease outbreaks	A user-friendly web application (T-Racing) was developed in an R environment to support epidemiological investigations through interacting maps, network graphs, and tables. The application relies on Temporal Network Analysis techniques and accounts for the dynamic nature of animal trade, to perform a quick and efficient back and forward tracing activity. T-Racing makes use of web services to retrieve data from diverse Official National Databases, through the plumber package and has been distributed using Shinyproxy. Movement data underlying the spatial-temporal tracing pattern can be explored according to time frame, animal species, movement to slaughterhouses, and movements in and out of the selected farm. The forward/backward search can be performed from one or more farms, selected among those which had moved animals or notified outbreak of disease within a selected time frame and or falling in a user-defined spatial buffer. Users can add or remove links/nodes according to epidemiological information and/or spatial location, node's property, and network deepness, to get the most relevant results, including paths among outbreaks caused by genetically similar pathogens. Access restricted by username and password: (http://bioshiny.izs.intra:8080/)

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
	EpiExploreR is a user-friendly, flexible, R-Shiny web application, providing tools for the analysis of spatiotemporal data on animal diseases including

EpiExploreR: a ShinyWeb application for the analysis of Animal Disease data	notified outbreaks, surveillance of vectors, animal movements and remotely sensed data. Data exploration and analysis results are displayed through an interactive map, tables and graphs. EpiExploreR is addressed to scientists and researchers, including public and animal health professionals wishing to test hypotheses and explore data on surveillance activities. Link: https://pub.epiexplorer.izs.it/app_direct/epi01pub/

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
StoryMap on African Swine Fever (ASF)	An ArcGIS StoryMap has been created to report African Swine Fever (ASF) monitoring results using maps, tables, graphs and narrative text. (https://storymaps.arcgis.com/stories/7f16f51731654a4ea7ec54d6bc1f90d4)

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Design and implementation of an information system for veterinary and phyto-sanitary services of Tunisia (Conception et mise en place d'un système d'information des Services Vétérinaires e des Services Phytosanitarires en Tunisie"	During 2022 WOAH CC personnel worked in close cooperation with representatives of Tunisian veterinary services under a FAO-funded project for the design and development of a national information system allowing the services to record, manage and analyse data produced by their activities. The first design of the future information system was provided on April 2022, closing the first part of the project.

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Design and support to the maintenance of Italian national information system	Italian national information system includes several applications for recording and analysing the results of activities carried out by the Italian veterinary services, both in the animal health/welfare and food safety sectors. In 2022 a dashboard has been developed allowing exploring data on prescriptions of veterinary medicines in food-producing and companion animals. Several indicators of the use of antimicrobials in farms have been developed and represented.

Training, capacity building	
Title of activity	Scope
Twinning Project on Epidemiology and risk assessment between Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise "G. Caporale" (IZS-Teramo) and the Department of Animal Resources Risk Assessment (KSA ARRAD), Kingdom of Saudi Arabia	The general objective is to strengthen the skills and capacities of KSA ARRAD's personnel in performing relevant epidemiological data analysis and risk assessment studies. Due to the COVID-19 emergency, some training activities were not carried out in 2021. Only in 2022 the project re-started with two residential training sessions, held in Teramo from 24 January to 1 February 2022 and from 21 to 29 November 2022. The end of project is planned on 31/12/2023.

Training, capacity building	
Title of activity	Scope
The activities of the WOAH laboratory twinning initiative between IZS-Teramo and Instituto	

Biológico (IB) of São Paulo in Brazil are oriented to establish a Reference Laboratory for the epidemiology and diagnostics of Bluetongue diseases in São Paulo. The staff of the IB have been trained in virological, serological and entomological diagnosis of BTV until the activities stopped due to the COVID-19 pandemic. A training session, organised remotely, was organised from 18 to 20 July 2022, focussed on the epidemiological surveillance of BTV, and by the use of pre-recorder presentations on: Surveillance and surveillance systems, Concepts of disease and transmission patterns, Descriptive epidemiology, Sampling methods and approaches, Performance of the diagnostic tests.

The activities of the WOAH laboratory twinning initiative between IZS-Teramo and Instituto Biológico (IB) of São Paulo in Brazil are oriented to establish a Reference Laboratory for the epidemiology and diagnostics of Bluetongue diseases in São Paulo. The staff of the IB have been trained in virological, serological and entomological diagnosis of BTV until the activities stopped due to the COVID-19 pandemic. A training session, organised remotely, was organised from 18 to 20 July 2022, focussed on the epidemiological surveillance of BTV, and by the use of pre-recorder presentations on: Surveillance and surveillance systems, Concepts of disease and transmission patterns, Descriptive epidemiology, Sampling methods and approaches, Performance of the diagnostic tests.

Training, capacity building	
Title of activity	Scope
Webinar "Epitraining and risk communication". 13 June 2022.	In the framework of the MediLabSecure project. The participants were representatives of Public Health and Veterinary national authorities and laboratories of the Mediterranean, Black Sea and Sahel regions. Webinar contents were: Strategies for disease control, prevention, and eradication; Rapid risk assessment; One Health fundamentals.

TOR3: HARMONISATION OF STANDARDS

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

Proposal title	Scope/Content	Applicable area
Rift Valley fever action framework.	Personnel of the WOAH CC actively participated to the reviewing process of this guideline, which aims at providing a risk-based guidance on appropriate preparation, risk monitoring and response against RVF. Actions are recommended based on a country's epidemiological status and the epidemiological stage in the cycle of outbreaks in infected countries. (Mariner, J.C., Raizman, E., Pittiglio, C., Bebay, C., Kivaria, F., Lubroth, J., Makonnen, Y.. 2022. Rift Valley fever action framework. FAO Animal Production and Health Guidelines, No. 29. Rome. https://doi.org/10.4060/cb8653en)	health management
	Personnel of the WOAH CC actively participated in the preparatory activities for the preparation of these guidelines, which were developed based on the three-tier programme model used in public health, and adapted to the needs and requirements	

Developing field epidemiology training for veterinarians – Technical guidelines and core competencies	of the animal health sector using the "One Health" approach. These guidelines provide guidance on the development of new programmes, and detailed approaches for the assessment, evaluation and accreditation of FETV programmes. (FAO. 2021. Developing field epidemiology training for veterinarians – Technical guidelines and core competencies. FAO Animal Production and Health Guidelines No. 27. Rome. https://doi.org/10.4060/cb7545en)	Training and education

4. Did your Collaborating Centre maintain a network with other WOAH 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
WOAH CC on Epidemiology Emerging Avian Diseases	Italy	Europe	Implementation of a standard for the collection and sharing of zone geographic component (GeoZone)
National Center for Global Health Istituto Superiore di Sanità (ISS)	Italy	Europe	Project "Preventing biological risks increased by environmental and climate change in the Mediterranean, Black Sea and Sahel regions by strengthening a structured, inclusive and institutionalized One Health approach" (MediLabSecure)
Multiple partners within the OHEJP coordinated by the Statens Serum Institut (SSI)	Denmark	Europe	Collaboration within the MATRIX project, which aims to advance the implementation of One Health Surveillance (OHS) in practice, by building on existing resources, adding value to them and creating synergies among the sectors. In particular, identifying and describing existing cross-sectorial OHS programmes or potential programmes, extending the efforts of existing integrative OHEJP

			projects, which focus on separate or only two sectors
European Space Agency (ESA)	France	Europe	Collaboration in the framework of various project initiatives in the fields of Earth Observation Data and Satellite Imagery.
Goddard Earth Sciences Technology and Research (GESTAR) II Center	United States of America	Americas	The Goddard Earth Sciences Technology and Research (GESTAR) II Center is a cooperative entity between University of Maryland, Baltimore County (UMBC) and NASA Goddard Space Flight Center. The collaboration is established in the framework of the project: "Defining Ecoregions and Prototyping on EO-based Vector-borne Disease Surveillance System for North Africa (PROVNA)".

TOR4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOAH 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
WOAH CC on Reduction of the Risk of Disasters in Animal Health	Cuba	Americas	Collaboration in the framework of the OIE Collaborating Centre network on Veterinary Emergencies (OIE EmVetNet)
WOAH Reference Laboratory for Viral Encephalopathy and Retinopathy of Marine Fish	Italy	Europe	Strengthening capacity on aquatic animal health and epidemiological surveillance (Aquae strength)
WOAH Collaborating Centre on Biological Threat Reduction	United States of America	Americas	Collaboration in the framework of the OIE Collaborating Centre network

			on Veterinary Emergencies (OIE EmVetNet)
WOAH CC on Animal Production Food Safety	Italy	Europe	Development of risk assessment models in food safety
WOAH CC on Veterinary Training and Capacity Building	Italy	Europe	Collaboration on international training initiatives with particular focus on the development of e-learning contents on epidemiology, surveillance and risk analysis
ERFAN - Enhancing Research for Africa Network	Italy	Africa	Collaboration with training initiatives and project activities
Anses - Agence nationale de sécurité sanitaire de l'alimentation	France	Europe	Project for provision of support to EFSA and to ECDC in the production of the EU One Health Zoonoses report and in related zoonoses online interactive data visualisation dashboards and zoonoses
Istituto Superiore di Sanità	Italy	Europe	Project for provision of support to EFSA and to ECDC in the production of the EU One Health Zoonoses report and in related zoonoses online interactive data visualisation dashboards and zoonoses
Istituto Zooprofilattico Sperimentale delle Venezie	Italy	Europe	Project for provision of support to EFSA and to ECDC in the production of the EU One Health Zoonoses report and in related zoonoses online interactive data visualisation dashboards and zoonoses
Istituto Zooprofilattico Sperimentale		Europe	Project for provision of support to EFSA and to ECDC in the production of the EU One Health Zoonoses report

della Lombardia e dell'Emilia Romagna	Italy		and in related zoonoses online interactive data visualisation dashboards and zoonoses

TOR6: EXPERT CONSULTANTS

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

Yes

NAME OF EXPERT	KIND OF CONSULTANCY	SUBJECT
Paolo Calistri	Participation at the OIE/IHSC 3rd Regional Webinar on: OIE standards and procedures to facilitate international movement of (competition) horses. 28 March 2022	Risk Analysis on potential re-emergence of major equine diseases
Paolo Calistri	Participation at the 24th JPC REMESA, Palermo (Italy) 29 –30 June 2022	Defining Ecoregions and Prototyping an EO-based Vector-borne Disease Surveillance System for North Africa (PROVNA)
Paolo Calistri	Participation at the 25th JPC REMESA, Amman (Jordan) 13-14 December 2022	Defining Ecoregions and Prototyping an EO-based Vector-borne Disease Surveillance System for North Africa (PROVNA) – Update of project's activities
Daria Di Sabatino	Expert	Expert group to the WOAH Observatory

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

Yes

The WOAH CC provide advice and/or services mainly in the establishment of the surveillance systems, including the design and development of supporting information systems, and risk assessment methodologies, providing advice to the competent authorities of WOAH Members and through specific capacity building initiatives. These activities are carried out in the framework of various project upon different funding lines and other opportunities provided by international workshops and conferences.
The WOAH Member Countries mainly involved in these activities are those belonging to the following geographical areas: North Africa, the Balkans, the Middle East and Arabic Peninsula. Sub-Saharan countries are involved through the ERFAN initiative.

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

Yes

a) Technical visit : 0

b) Seminars : 85

c) Hands-on training courses: 6

d) Internships (>1 month) : 0

TYPE OF TECHNICAL TRAINING PROVIDED (A , B, C OR D)	CONTENT	COUNTRY OF ORIGIN OF THE EXPERT(S) PROVIDED WITH TRAINING	NO. PARTICIPANTS FROM THE CORRESPONDING COUNTRY
c	Training course on veterinary epidemiology	Kingdom of Saudi Arabia	6
b	Webinar on Epidemiology	Brazil	1
b	Webinar "Epitraining and risk communication"	Albania, Algeria, Bosnia and Herzegovina, Burkina Faso, Egypt, Georgia, Kosovo, Lebanon, Libya, Morocco, Niger, Palestine, Armenia, North Macedonia, Romania, Serbia, Spain, Tunisia, Turkey	44
b	Webinar on: OIE standards and procedures to facilitate international movement of (competition) horses	Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, Turkey, UAE	40

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 WOAH?

Yes

NATIONAL/INTERNATIONAL	TITLE OF EVENT	CO-ORGANISER	DATE (MM/YY)	LOCATION	NO. PARTICIPANTS
International	ERFAN Working groups meeting on Brucellosis	ERFAN Secretariat with the WOAH reference laboratory for Brucellosis	2022-09-15	Giulianova, Italy	24

TOR9: DATA AND INFORMATION DISSEMINATION

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

a) Articles published in peer-reviewed journals:

7

1. Acciari V.A., Ruolo A., Torresi M., Ricci L., Pompei A., Marfoglia C., Valente F.M., Centorotola G., Conte A., Salini R., D'Alterio N., Migliorati G., Pomilio F. (2022). Genetic diversity of Listeria monocytogenes strains contaminating food and food producing environment as single based sample in Italy (retrospective study). International Journal of Food Microbiology, Volume 366, 2022, 109562, ISSN 0168-1605, https://doi.org/10.1016/j.ijfoodmicro.2022.109562 .

2. *Amdouni J., Conte A., Ippoliti C., Candeloro L., Tora S., Sghaier S., Hassine T.B., Fakhfekh E.A., Savini G., & Hammami S. (2022). Culex pipiens distribution in Tunisia: Identification of suitable areas through Random Forest and MaxEnt approaches. Veterinary Medicine and Science, 00, 1– 13. https://doi.org/10.1002/vms3.897*

3. *Amato L., Candeloro L., Di Girolamo A., Savini L., Puglia I., Marcacci M., Caporale M., Mangone I., Cammà C., Conte A., Torzi G., Mancinelli A., Di Giallonardo F., Lorusso A., Migliorati G., Schael T., D'Alterio N., Calistri P. (2022). Epidemiological and genomic findings of the first documented Italian outbreak of SARS-CoV-2 Alpha variant of concern. Epidemics, 39, 100578. Advance online publication. https://doi.org/10.1016/j.epidem.2022.100578*

4. *Serroni A., Ulisse S., Iorio M., Laguardia C., Testa L., Armillotta G., Caporale M., Salini R., Lelli D., Wernery U., Raghavan R., Mercante M.T., Ventura M. (2022). Development of a Competitive Enzyme-Linked Immunosorbent Assay Based on Purified Recombinant Viral Protein 7 for Serological Diagnosis of Epizootic Haemorrhagic Disease in Camels, Journal of Tropical Medicine, vol. 2022, Article ID 5210771, 10 pages, 2022. https://doi.org/10.1155/2022/5210771*

5. *Goffredo M., Quaglia M., De Ascentis M., d'Alessio S.G., Federici V., Conte A., Venter G.J. (2022). The Absence of Abdominal Pigmentation in Livestock Associated Culicoides following Artificial Blood Feeding and the Epidemiological Implication for Arbovirus Surveillance. Pathogens. 2021 Dec 2;10(12):1571. doi: 10.3390/pathogens10121571 . PMID: 34959526; PMCID: PMC8705276. (accettato a Dicembre 2021 e non presente nella relazione 2021)*

6. *Lombardi A., Manzi M. P., Giacinto F.D., Colaiuda V., Tomassetti B., Papa M., Ippoliti C., Giansante C., Ferri N., Marzano F.S. (2022). Coastal Water Quality: Hydrometeorological Impact of River Overflow and High-resolution Mapping from Sentinel-2 Satellite. In: Tsuzuki, M. S. G., Rahman, R. O. A., editors. Engineering Problems - Uncertainties, Constraints and Optimization Techniques [Working Title] [Internet]. London: IntechOpen; 2022 [cited 2022 Jul 26]. Book Chapter available from: https://www.intechopen.com/online-first/82160 doi: 10.5772/intechopen.104524*

7. *Pediconi O., D'Albenzio S., Gkrintzali G., Calistri P., & Georgiev M. (2022). Crisis Preparedness Exercise on Rift Valley Fever Introduction into Europe under a One Health Approach. Microorganisms, 10(9), 1864. https://doi.org/10.3390/microorganisms10091864.*

b) International conferences:

7

1. *Ippoliti C., Vincenzi S., Bonicelli L., D'Alessio S.G., Di Lorenzo A., Tora S., Porrello A., Calderara S., De Ascentis M., Quaglia M., Goffredo M., Conte A. Sentinel 2 and Deep Learning methods to map Culex pipiens distribution in central Italy, ESA LIVING PLANET SYMPOSIUM, Bonn, 23-27 Maggio 2022*

2. *Ippoliti C., Vincenzi S., Bonicelli L., D'Alessio S.G., Di Lorenzo A., Tora S., Porrello A., Calderara S., De Ascentis M., Quaglia M., Goffredo M., Conte A. Sentinel 2 and Deep Learning methods to map Culex pipiens distribution in central Italy, Webinar 15.11.2022 in THEIA Atelier Télédétection Et Risques & Maladies Infectieuses, CIRAD https://www.theia-land.fr/sante/2022-rmi/*

3. *Tomassetti B., Lombardi A., Colaiuda V., Conti F., Mascilongo G., Capoccioni F., Pulcini D., Di Francesco G., Di Renzo L., Profico C., Ippoliti C., Giansante C., Ferri N., and Di Giacinto F. FORESHELL Project: development of sanitary/weather-environmental predictive technological tools to enhance the efficiency and sustainability of shellfish farming., EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-12798, https://doi.org/10.5194/egusphere-egu22-12798, 2022.*

4. *Calistri P. Tools for and experiences gained with SARS-CoV-2 monitoring and prevention. EFSA ONE Conference 2022. Bruxelles 21 to 24 Giugno 2022.*

5. *Telera G., Candeloro L., Savini L., Calistri P., Conte A., De Massis F.: T-Racing: a contact tracing tool for supporting epidemiological investigation during livestock disease outbreaks. ISVEE16 2022, August 7 - 12, 2022, The Halifax Convention Centre.*

6. *Candeloro L., Savini L., Calistri P., Palma D., Ferrilli M., Conte A., De Massis F. T-Racing: a contact tracing tool for supporting epidemiological investigation during livestock disease outbreaks. Brucellosis 2022 International Research Conference, including the 74th Brucellosis Research Conference, Giulianova - Teramo, Italy, September 16 - 19 2022.*

7. *Romualdi T., Janowicz A., Di Marcantonio L., Foschi G., De Massis F., Tittarelli M., Conte A., Candeloro L., Garofolo G. Machine Learning for MALDI-TOF MS identification of Brucella. Brucellosis 2022 International Research Conference, including the 74th Brucellosis Research Conference, Giulianova - Teramo, Italy, September. 16 - 19 2022.*

c) National conferences:

1

1. *Ippoliti C., Vincenzi S., Bonicelli L., D'Alessio S.G., Di Lorenzo A., Tora S., Porrello A., Calderara S., De Ascentis M., Quaglia M., Goffredo M., Conte A. Sentinel 2 and Deep Learning methods to map Culex pipiens distribution in central Italy, MOOD - Identify Signs And Drivers Of Zoonotic Diseases Emergence And Digital Data Resources For Epidemic Intelligence, Trento, 28-29 Settembre 2022 https://mood-h2020.eu/event/identify-signs-and-drivers-of-zoonotic-diseases-emergence-and-digital-data-resources-for-epidemic-intelligence*

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

11. What have you done in the past year to advance your area of focus, e.g. updated technology?
Innovative approaches and methodologies for data analysis are renewing the discipline of epidemiology, especially those linked to WGS, machine learning and analysis of big data. This WOAH CC is following different and specific approaches to advance in our area of expertise, including (i) the participation of personnel to national and international training initiative on innovative methods, (ii) to strength the collaboration with international institutions specialised in specific innovative methodologies, and (iii) the acquisition of specialised personnel (including PhD students).

12. Additional comments regarding your report:
The COVID-19 pandemic and related travel restrictions have influenced international training and collaboration activities, hampering the organization of face-to-face meetings and residential courses. During two years, 2020 and 2021, almost all initiatives were performed online, taking benefits of different available meeting platforms. In 2022, albeit a certain relaxation in the application of travel restrictions, the experiences gained with on-distance learning and meetings have led to the use of these tools and to continue following online approaches also for this year. In fact, several benefits in terms of costs and number of participants suggest the use of online platform for various type of initiatives. A mixed approach (online and face-to-face) is expected to be followed in the next future, regardless the COVID-19 travel restrictions in place.