

WOAH Collaborative Centre Reports Activities 2023

Activities in 2023

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Centre Information

Title of WOA Collaborating Centre	Animal Production Food Safety
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Name of the writer:	Francesco Pomilio

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

Category	Title of activity	Scope
Epidemiology, surveillance, risk assessment, (true)	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. The dashboard developed in 2022 for data exploring on prescriptions of veterinary medicines in food producing and companion animals has been maintaining in 2023. Several indicators of the use of antimicrobials in farms have been developed and represented.
Training, capacity building (true)	ERFAN (Enhancing Research for Africa Network) - ERFAN Dialogues - "Analyse des Norovirus et virus de l'Hépatite A dans les denrées agro-alimentaires"	On line asynchronous training course always available at the ERFAN website. https://www.erfan.it/en/home/
Diagnosis, biotechnology and laboratory (true)	Determination of veterinary drug residues and environmental contaminants including pesticides and heavy metals in animal tissues, biological fluids and feeds (Namibia)	A collaboration agreement between Central Veterinary Laboratory and IZSAM was signed for the analytical determination and confirmation of certain veterinary drugs residues and contaminants in food by the chemistry laboratory of IZSAM.
		The aim of the project is to develop a biosecurity

<p>Food Safety (true)</p>	<p>EJP on Project Biosecurity practices for pig farming across Europe (Biopegee)</p>	<p>protocol for the primary production. Additionally, field and intervention studies will be completed in areas where current evidence is weak, e.g. effectiveness of management controls on HEV prevalence; To develop and apply a protocol for slaughterhouse biosecurity and disinfection effectiveness; To develop scenarios on country-specific biosecurity measures and on the measures' impact on human infection rate will be run. Results will be used to assess the economic profitability of the implementation of standard and specific intervention measures along the pig supply chain and to assess projected future pork-product derived human salmonellosis cases; To develop a catalogue of biosecurity measures based on the findings on the measures' effectiveness and costs for Salmonella and HEV</p>
<p>Food safety (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) Food Safety Working Group project drafting on "Baseline study on <i>Listeria monocytogenes</i>, <i>Salmonella</i> spp. and <i>Klebsiella pneumoniae</i> prevalence and AMR in RTE meat products and environmental samples in Botswana, Italy, Namibia, South Africa and Zambia – LISAK"</p>	<p>Baseline study started in 2021 in collaboration with universities, laboratories and other institutions in the SADC countries.</p>
<p>Food safety (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) - "Studies of <i>E. coli</i>, <i>Salmonella</i> spp. <i>Klebsiella pneumoniae</i> and <i>Listeria monocytogenes</i> prevalence and AMR in Raw and RTE meat in Khartoum state - ECOSAKAL</p>	<p>Baseline study started in 2022.</p>
<p>Food safety (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) – Research Project SSRP "Isolation and characterization of <i>Listeria monocytogenes</i> from ready - to eat meat, frozen raw broiler chicken, swabs from chicken slaughterhouses and milk products (cheese and ice cream) in Khartoum state", Central Veterinary Research Laboratory, Soba-Sudan – LIMOS</p>	<p>Technical support to the project. The CVRL tested 350 samples from which: 5 strains of <i>Bacillus cereus</i>, 10 strains of <i>Enterococcus</i> spp. 10, 24 strains of <i>Listeria</i> spp. and 8 strains of <i>Corynebacterium</i> spp.</p>
<p>Diagnosis, biotechnology and laboratory (true)</p>	<p>EJP Project on Biosecurity practices for pig farming across Europe (Farmed)</p>	<p>The FARMED project aims to address AMR by using the ONT MinION, comparing this technology to other metagenomic sequencing technologies, and assessing its ability for diagnostic use on a range of sample matrices within both the laboratory and the field. The project will develop efficient real-time mapping strategies that identify the origin of the genetic context of AMR genes, identify the host bacterial species to enable specific pathogen detection.</p>
<p>Training, capacity building (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) - ERFAN Dialogues - "Detection of <i>Salmonella</i> spp. according to ISO6579-1 :2017"</p>	<p>On line asynchronous training course always available at the ERFAN website. https://www.erfan.it/en/home/</p>
<p>Training, capacity building (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) - ERFAN Dialogues - "Brucellosis Diagnosis and Control</p>	<p>On line asynchronous training course always available at the ERFAN website. https://www.erfan.it/en/home/</p>
<p>Training, capacity building (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) - ERFAN Dialogues – " <i>Campylobacteriosis</i>: a public health issue"</p>	<p>This course was provided both in synchronous and asynchronous mode. The on line asynchronous course is always available at the ERFAN website. https://www.erfan.it/en/home/</p>

<p>Training, capacity building (true)</p>	<p>EU Twinning Project between Lithuania, Hungary, Italy and Bosnia and Herzegovina “EU’s support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina” EuropeAid/166812/DD/ACT/BA</p>	<p>The objective of the project is to provide Bosnia and Herzegovina for efficient legislation, gradually aligned with Union acquis, and its effective implementation, as well as consolidated procedures related to the official controls across the policy area, in order to ensure consumer health protection are all part of the overall food safety system.</p>
<p>Training, capacity building (true)</p>	<p>EU Twinning Project MG 19 FED AG 01 21 EuropeAid/173682/DD/ACT/MG. “Support to improve the sanitary and phytosanitary quality monitoring and control system and compliance of agricultural and agri-food products in Madagascar”</p>	<p>The overall objective of the Twinning Project is to contribute to improving food security in Madagascar. The Project forms part of a regional programme intended to support food and nutritional security in the Indian Ocean, the aim of which, amongst others, is to encourage and promote agricultural exchanges between Member States of the Indian Ocean Commission. The Project will therefore indirectly contribute to improving food security in the other countries in the region that are partly dependent on imports to cover the food needs of their citizens.</p>
<p>Training, capacity building (true)</p>	<p>WOAH Twinning between the IZSAM “G. Caporale” and the Republican Veterinary Laboratory (RVL) of Azerbaijan</p>	<p>The project aims to improve technical knowledge and skills of RVL staff, to enable RVL to become a reference laboratory for food safety and eventually to acquire WOAH Collaborating Centre status.</p>
<p>Training, capacity building (true)</p>	<p>ERFAN (Enhancing Research for Africa Network) Food Hygiene Working Group South Africa</p>	<p>On line Working group “Food Hygiene” South Africa, March 2023 with Namibia, Mozambique, Zambia, Zimbabwe, Italia</p>
<p>Diagnosis, biotechnology and laboratory (true)</p>	<p>EJP Project on Cross-sectoral framework for quality Assurance Resources for countries in the European Union (Care)</p>	<p>The CARE project will focus on developing new One Health concepts for proficiency testing (PT) of laboratories, reference materials and quality/availability of demographic data. The aim of CARE are: to develop new PT schemes that can be used cross-sectorally and thereby used to evaluate the capacity to manage foodborne issues from a One Health perspective; to provide insight to available and desirable RM, identifying sources of both strains and genomic data, including the field of antimicrobial resistance (AMR), provided by reference laboratories and other relevant sources such as online repositories and national collections; to give visibility of the reference material and data associated for the scientific community. The emphasis will be on the availability and sustainability of this reference collection in order to contribute to the long-term needs of the European research; to disseminate more widely the information about the accessibility not only of the reference collection but also of CARE partner microbial collections; to assess the quality and availability of the demographic data and focus on how to improve and make the data better by raising awareness of EU authorities collecting and organizing demographic data.</p>
<p>Food safety (true)</p>	<p>EFSA GP/EFSA/ENCO/2020/03 Partnering grants – GA 3 “Listeripredict: Application of novel predictive microbiology techniques to shelf-life studies on Listeria monocytogenes in ready-to-eat foods”</p>	<p>Participation as an operational unit in the project with the Universities of Dublin (Ireland) and Cordoba (Spain), and the Polytechnic University of Braganza (Portugal)</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
Contribution to the activities of the European Commission on Food Safety	On behalf of Ministry of Health, two IZSAM experts are members of the DG Health and Food Safety - Working Group (WG) on Persistent Organic Pollutants in Food". The aim of the WG is to define health guidelines and make proposals in the framework of the EU legislation on chemical contaminants in foodstuffs. Main issues discussed during 2023 were as follows: 1) Feedback from the Member States on their experiences as regards the enforcement of the maximum levels for PFAS in food; 2) Discussion on requested modifications on the derogation for dioxins and dioxin-like PCBs in fish from the Baltic region; 3) Discussion on the establishment of maximum levels for non-dioxin-like PCBs in meat and meat products of horse, rabbit, wild boar (<i>Sus scrofa</i>), wild game birds, Cervidae (e.g. venison), liver and derived products of wild game birds; 4) Update on the analysis of chlorinated paraffins by the EURL and discussion on approach for monitoring; Publication of new WHO-TEF values for dioxins and PCBs: Information and exchange of view on the regulatory follow-up.	Laboratory expertise Animal production
Development of analytical criteria to harmonise the European regulations applicable to the surveillance and control of food and feed safety	Experts from the IZSAM are involved in the network "European Reference Laboratory and National Reference Laboratories for Halogenated POPs in Feed and Food", in order to harmonise the analytical methods used for the determination of POPs in food and feed. In particular, experts contributed to define/revise analytical criteria for the determination of Brominated Flame Retardants in Food (in particular PBDEs e HBCDDs) and analytical criteria for the determination of Perfluorinated compounds in food and feed.	Laboratory expertise
European Commission	Working group on "Microbiological criteria", DG-SANTE - for the drafting of a guideline on the "Official controls, under Regulation EC no. 2017/625, concerning microbiological sampling and testing of foodstuffs.	Animal production

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOA?H?

Yes

Research need : 1

Please type the Research need: To date, genomic epidemiology is a discipline characterised by constant and fast developments with several applications on several health issues. In particular, surveillance based on whole genome sequencing (WGS), in various contexts and following innovative approaches (for example wastewater surveillance for SARS-CoV-2 or other pathogens, including zoonotic agents, or for monitoring AMR trends and patterns), has clearly demonstrated to have good accuracy and be able to represent a valid alternative for early warning systems. I am not sure how this could impact Codes and Manuals, but more applications are expected in future for animal health, including trade and/or risk-based surveillance (for example for the demonstration of free status

Relevance for WOA?H Disease Control, Capacity Building, Other, Standard Setting, Animal Welfare, Facilitation of international collaboration,

Relevance for the Codes or Manual Code, Manual,

Field Epidemiology and Surveillance, Diagnostics, Vaccines, Therapeutics,

Animal Category Terrestrial, Aquatic,

Disease:

Kind of disease (Zoonosis, Transboundary diseases) Zoonosis, Transboundary diseases,

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer:

Notes:

Answer:

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

Yes

Name of WOAHA CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
EFSA- ECDC	Parma- Stockholm	Europe	<ul style="list-style-type: none"> • Technical support for the provision of the Campylobacter data visualization dashboard in the EFSA information system; • Data analysis and validation of data related to Campylobacter and Listeria within the EU collected in 2023 according to DIRECTIVE 2003/99/CE; • Drafting and revision of the European Union One Health report EFSA/ECDC on Zoonosis (data related to 2022), namely the chapter on Campylobacter and Listeria monocytogenes, both the section relating to occurrence in food and animals; • EFSA Network on "Biohaz Microbial Risk Assessment". Participation as Member of the Network • Working group on prolonged multi-country cluster of Listeria monocytogenes ST155 infections linked to ready-to-eat fish products
European Reference Laboratory for Campylobacter spp.	Sweden	Europe	<p>The EU-RL for Campylobacter's staff is involved in the following activities:</p> <ul style="list-style-type: none"> • Participation in the EU-RL PT34 "to verify the performance of the laboratory in performing the enumeration of Campylobacter spp. on chicken skin (ISO 10272-2:2017) and species identification (the latter on voluntary basis)"; • Participation in the EU-RL PT35 on "detection and identification of Campylobacter spp. from boot-socks and species identification (the latter on voluntary basis)"; • Working Group CEN/TC 463/WG 3 'Campylobacter'" to discuss technical aspects related to the isolation standard ISO 10272-1:2023 – Amd 1. • Working Group EU-RL for the development of the EFSA WGS system for Campylobacter to discuss about wg/cg MLST schemes about animal, food and clinical laboratories (EURL/SSI) and implementation into the One Health WGS system - background: priorities in the schemes selection for other pathogens and technical requirements; • Participation in a survey to collect data on suspected

			<p>food borne outbreaks of campylobacteriosis in several European countries within the EURL-Campylobacter network based on clinical cases of C. jejuni ST-464; • Implement the use of WGS and cluster analysis through distance matrices or phylogenetic trees; • Test the laboratory's ability to address a Campylobacter outbreak based on sequencing data.</p>
Istituti Zooprofilattici Sperimentali (Official Labs) and Private laboratories	Italy	Europe	<p>In 2023 the LNR Lm organized the following PT and provided to other laboratories: • Identification of Listeria monocytogenes through the USDA/FSIS method, ID number 24/2023; • First PT inter-laboratory PT for challenge test for the assessment of Listeria monocytogenes growth potential in a ready-to-eat product.</p>
Official Labs - Istituti Zooprofilattici Sperimentali	Italy	Europe	<p>In 2023 the LNR for Campylobacter spp. organized the following PT and provided to other laboratories: • 13/2023 "Detection of Campylobacter spp. from stool samples" according to IZSO 10272-1:2023 – AMD 1 or other methods in use. • 13-2023 "Campylobacter Food for the enumeration of Thermotolerant Campylobacter numeration in chicken meat" with the aim of verifying the performances of the attending laboratories in numbering Campylobacter spp. from freeze-dried chicken meat matrix according to ISO 10272-2:2023 - AMD 1 or other method in use in laboratories. In 2023 the LNR for Campylobacter spp. participated in the PT provided by IZS delle Venezie "AQUA MA 3-23" for the detection (ISO 10272-1:2017) and enumeration (ISO 10272-2:2017) of Campylobacter spp. in milk powder and the detection of Campylobacter spp. (ISO 10272-1:2017) in freeze-dried meat.</p>
European Reference Laboratory for Listeria monocytogenes	France	Europe	<p>• Participation at the EU-RL Lm PT: "Anses_LSAI_23_03_EURL_Lm_Det_Enu Proficiency test dedicated to detection and enumeration of Listeria monocytogenes in dairy product according to EN ISO 11290-1 and 2 :2017". • Urgent inquiries related to multi-Countries outbreak of Listeriosis • Working group for the revision of the EURL Lm DG SANTE Guidance Document for "FBO, on shelf-life studies of RTE foods related to Listeria monocytogenes conducting shelf-life studies on Listeria monocytogenes • Working group for the revision of the EURL Lm Guideline on environmental</p>

			sampling for <i>Listeria monocytogenes</i>
University College of Dublin	Ireland	Europe	Research project within the EU-FORA (European Food Risk assessment Fellowship Program) 2023-2024 : "ListeriaControl".
Wageningen Bioveterinary Research	The Netherlands	Europe	Participation in the PT organized by the Wageningen Bioveterinary Research to detect <i>Campylobacter</i> spp. through the method in use within the centre form the preputial fluid.
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise and Istituto Zooprofilattico Sperimentale del Lazio e della Toscana	Italy	Europe	Research project on <i>Campylobacter</i> eco-epidemiology and the antimicrobial resistance in Italy (EcoCampy).
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise	Italy	Europe	Research project on "CRISPR-Cas" as antimicrobial in ESBL producing Enterobacteriaceae (CRISPone).
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise	Italy	Europe	Research project on the effectiveness of different treatments with probiotics and prebiotics in counteracting colonization by <i>Campylobacter</i> spp. in chicken (CAMPYBIOTICS).
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise	Italy	Europe	Launch of the project on Development of a rapid diagnostic test for the detection of <i>Campylobacter</i> in livestock production and food based on CRISPR-Cas and lateral-flow technology. (CAMP-RADAR)
Human health system of Abruzzo and Molise	Italy	Europe	Characterization of <i>L. monocytogenes</i> strains from clinical cases in Abruzzo region.
Istituto Superiore di Sanità (Rome) - ISS	Italy	Europe	<ul style="list-style-type: none"> • Building a common database of NGS data containing human and non-human strains of <i>Listeria monocytogenes</i>. • Working group "Export USA" with official labs for testing food intended for USA export.
Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise	Italy	Europe	Research project on the Development of an optimised Antimicrobial Resistance monitoring strategy for wastewaters (DeARM-WATER). The project aims to define practical guidelines for wastewater monitoring and validation of standardized protocols as well as to determine threshold values for risk assessment related to the presence of specific resistance genes".

Istituto Zooprofilattico Sperimentale della Lombardia Emilia Romagna, Istituto Zooprofilattico Sperimentale Lazio e Toscana, Istituto Zooprofilattico Sperimentale Umbria e Marche	Italy	Europe	Research project as Principal investigator "Multidisciplinary study on ritual slaughter: food safety, animal welfare, and socio-cultural aspects in the production and consumption of Halal and Kosher meat (THalaKos)".
Istituto Zooprofilattico Sperimentale della Lombardia e dell'Emilia Romagna	Italy	Europe	<ul style="list-style-type: none"> • Studies on <i>Listeria monocytogenes</i> strains detected in food producing establishments. • Studies on factors influencing the effectiveness of treatment with high hydrostatic pressures (HPP) on the <i>Salmonella</i> and <i>Listeria monocytogenes</i> reduction in some fermented meat products. • Studies on the epidemiology of listeriosis in Italy: assessment of the virulence of food isolates and correlation with clinical isolates.
College of Milan – Department of Veterinary Medicine and Animal Sciences	Italy	Europe	Research project GR-2021-12374382 "Towards a fair and sustainable production in marginal areas: novel indicators to improve animal welfare"
Istituto Zooprofilattico Sperimentale della Sicilia	Italy	Europe	Research project on Monitoring and molecular characterisation of <i>Listeria monocytogenes</i> isolates from food matrices and human sources for the Development of a programme considering the veterinary medical integration in the monitoring of listeriosis in Sicily as Unit.
Istituto Zooprofilattico Sperimentale delle Venezie	Italy	Europe	<ul style="list-style-type: none"> • Clustering analysis between clinical case's strain and strains isolated from food. • Collaboration to train lab staff on genomic characterization of <i>L. monocytogenes</i>. • Collaboration on the assessment of challenge test and risk analysis related to <i>Listeria monocytogenes</i> in ready-to-eat and not ready-to-eat food Consultancy for the use of <i>Listeria innocua</i> in challenge test in production plants.
Istituto Zooprofilattico Sperimentale dell'Umbria e delle Marche; Istituto Zooprofilattico Sperimentale del Lazio e della Toscana; Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta; University of Modena and Reggio Emilia - Department of Engineering	Italy	Europe	Research project on "Machine learning for <i>Listeria monocytogenes</i> prediction using WGS data (MeLeMaT)" as Principal investigator.
Istituto Zooprofilattico Sperimentale	Italy	Europe	Research project IZS UM 01/19 RC: "Role of different food matrices in

dell'Umbria e delle Marche			transmission of <i>Listeria monocytogenes</i> "
Istituti Zooprofilattici Sperimentali	Italy	Europe	On line meetings (n. 2) within the Working Group on "microbiological challenge tests", that is operational starting from 2023.
Ministry of Health (Rome) - MoH	Italy	Europe	Participation in the coordinated working group for the drafting of the national guideline on official controls for food.
Ministry of Health (Rome) - MoH	Italy	Europe	<ul style="list-style-type: none"> • Working group on <i>Listeria</i> DGISAN - with the Istituto Superiore di Sanità (Roma) and competent Authorities involved in outbreak's investigation of human listeriosis caused by ST155, ST8 e ST1. • Working group of the MoH (coordinated by the ISS) on national microbiological criteria related to food. • Working group with the IZSve for the drafting of a sampling plan for "source tracking" following the detection of <i>Listeria monocytogenes</i> Sequence type 155 in sausages. • Expert opinion to the Ministry of Health and the Veneto Region on the timing and cooking methods of products involved in the outbreak of listeriosis ST155. • Expert opinion to the MoH to conduct investigations relating to outbreaks of listeriosis in Italy
Local Competent Authority : ASL Barletta-Trani-Andria	Italy	Europe	Expert opinions (n. 4) to the Public Health Competent Authority of Barletta-Trani-Andria province (Apulia region) on the thermal inactivation of <i>Listeria monocytogenes</i> in different types of olives.
Local Competent Authority : ASL Abruzzo 2	Italy	Europe	Expert opinion (n. 1) to the Veterinary Competent Authority on <i>Listeria monocytogenes</i> in frozen vegetable products.
Istituto Zooprofilattico Sperimentale della Sicilia	Italy	Europe	Expert opinion (n. 1) to the Istituto Zooprofilattico Sperimentale della Sicilia on detection and/or enumeration of <i>Listeria monocytogenes</i> in brick packs of pasteurized egg white.
Local Competent Authority : ASL Ancona	Italy	Europe	<ul style="list-style-type: none"> • Expert opinion (n. 1) to the Veterinary Competent Authority on challenge test study on <i>Listeria monocytogenes</i> in cold smoked salmon from Lithuania. • Expert opinion (n. 1) to the Veterinary Competent Authority on challenge test study on <i>Listeria monocytogenes</i> in cold smoked salmon from Poland.

Veneto Region	Italy	Europe	<ul style="list-style-type: none"> • Expert opinion (n. 1) to the Veneto Region on challenge test study on <i>Listeria monocytogenes</i> in typical "sfilacci di cavallo". • Expert opinion (n. 1) to the Veneto Region on <i>Listeria monocytogenes</i>' inactivation with high pressures (HPP) in typical "sfilacci di cavallo".
Local Competent Authority : AULSS2 Veneto	Italy	Europe	Expert opinion to the AUSLL2 Veneto to conduct investigations relating to a case of listeriosis belonging to ST763.
University of Naples	Italy	Europe	Studies on <i>Pseudomonas</i> spp. and <i>Klebsiella</i> spp. strains contaminating healthcare setting environment.
University of Milan	Italy	Europe	<ul style="list-style-type: none"> • Studies on <i>Listeria monocytogenes</i> typing detected in food producing establishments. • Studies on challenge testing assessment and risk analysis related to <i>L. monocytogenes</i> in ready-to-eat food.
University of Teramo	Italy	Europe	<ul style="list-style-type: none"> • Studies on <i>Listeria monocytogenes</i> strains contaminating food production environment. • Development of genomic methods for the detection of <i>Listeria monocytogenes</i>. • Studies on <i>L. monocytogenes</i> proteomics.
University of Bologna – Department of Veterinary Medicine	Italy	Europe	Research project on MALDI-TOF and Artificial intelligence for bacterial typing, direct diagnosis and antimicrobial rapid detection (MALD-IA). To develop a MALDI-TOF MS spectra analysis system based on machine learning algorithms for the: (i) identification and rapid typing of <i>Brucella</i> , <i>Campylobacter</i> and <i>L. monocytogenes</i> ; (ii) identification of the main etiological agents of mastitis from milk; (iii) rapid identification of antibiotic resistance in the pathogens of interest (MALD-IA).
WOAH CC on Epidemiology, modelling and surveillance	Italy	Europe	Development of risk assessment models in food safety.

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 WOAHC CC/RL/other	Region of
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organisation(s)	Location	networking Centre	Purpose
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
Central Veterinary Laboratory	Azerbaijan	Asia and Pasific	Online assistance on Food safety laboratory quality assurance
ERFAN - Enhancing Research for Africa Network	Italy	Africa	Collaboration with training initiatives and project activities
Istituto Superiore di Sanità (ISS)	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. On line call and provision of sequences.
Central Veterinary Institute (CVRI)	Zambia	Africa	<ul style="list-style-type: none"> • Research project on Prevalence studies on <i>Listeria monocytogenes</i>, <i>Salmonella</i> spp. and <i>Klebsiella</i> spp. in food for human consumption, including AMR of detected strains. • Collaboration within the partnership with the University of Teramo for a PhD on Food Hygiene. • Collaboration with the Central Veterinary Research Institute in Lusaka for setting up a laboratory for food microbiology.
University of Namibia (UNAM)	Namibia	Africa	Research project on Prevalence studies on <i>Listeria monocytogenes</i> , <i>Salmonella</i> spp. and <i>Klebsiella</i> spp. in food for human consumption, including AMR of detected strains.
Central Veterinary Laboratory of Namibia (CVL)	Namibia	Africa	<ul style="list-style-type: none"> • Research project on Prevalence studies on <i>Listeria monocytogenes</i>, <i>Salmonella</i> spp. and <i>Klebsiella</i> spp. in food for human consumption, including AMR of detected strains.

National Veterinary Laboratory (BNVL)	Botswana	Africa	<ul style="list-style-type: none"> • Research project on Prevalence studies on <i>Listeria monocytogenes</i>, <i>Salmonella</i> spp. and <i>Klebsiella</i> spp. in food for human consumption, including AMR of detected strains.
Central Veterinary Research Laboratory (CVRL)	Sudan (Khartoum state)	Africa	<ul style="list-style-type: none"> • Baseline study on the prevalence of <i>Listeria monocytogenes</i> from frozen ready to eat (RTE) meat, frozen raw broiler chicken and milk products (cheese and ice cream).
Italian and Madagascar Ministry of Agriculture	Madagascar, Italy	Africa Europe	<p>European Twinning project on food safety funded by the EU with the Ministry of Agriculture and the Ministry of Education and Scientific Research of Madagascar "Appui au renforcement du dispositif de surveillance et de contrôle de la qualité et conformité sanitaire et phytosanitaire des produits agricoles et agroalimentaires à Madagascar". A collaboration with the colleagues of the Italian Ministry of Agriculture was established within the project and the WOAHC Animal production and Food safety coordinated the activities.</p>
OIE CC University of Pretoria, National Central Veterinary Laboratories, and some Faculties of Veterinary Science of other African countries: Angola, Mozambique, Namibia, Tanzania, Zambia and Zimbabwe	Various countries in Africa. Regional meetings in Windhoek (Namibia) and Tunis (Tunisia)	Africa	<p>ERFAN is a network to facilitate and strengthen collaboration among countries of the SADC Region and Arab Maghreb Union (UMA) as well as IZSAM in the Animal health and food safety domains. The main task is to allow the Parental Laboratory to support the Candidate Laboratory once the OIE Twinning Project is concluded, and the aims are to tackle some issues, as Efficiency of "Regional Pole of excellence" and Sustainability post OIE Twinning Project. During 2023, the ERFAN network continued its activities through regular online and in site meetings of the working groups, a general ERFAN meeting and organizing online activities and courses.</p>

TOR6: EXPERT CONSULTANTS

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

Yes

NAME OF EXPERT	KIND OF CONSULTANCY	SUBJECT
Alessandra Cornacchia, Maria Luisa Danzetta, Francesco Pomilio, Marina Torresi	Expertise in Food Safety and quality management of the laboratories	Twinning project: "EU support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina". On line Workshop to present and discuss the document "Foodborne and waterborne disease outbreaks: guideline for investigation and control", 08 - 12 May 2023.
Gabriella Centorotola, Alessandra Cornacchia, Francesco Pomilio, Marina Torresi	Expertise in Food Safety	• OIE funded initiative "ERFAN": online meetings of the working groups in the SADC Region.
Francesco Pomilio	Expertise in Food Safety and quality management of the laboratories	• OIE Twinning between the IZSAM "G. Caporale" and the Republican Veterinary Laboratory of Azerbaijan
Gabriella Centorotola, Alessandra Cornacchia, Alexandra Chiaverini, Francesco Pomilio, Marina Torresi	Expertise in Food Safety	Twinning WOAAH with Azerbaijan "Training activity on detection and characterization of <i>Listeria monocytogenes</i> and <i>Salmonella</i> spp." Training provided 23-24 February 2023.
Patrizia Centorame, Gabriella Centorotola, Alessandra Cornacchia, Violeta Di Marzio, Luigi Iannetti, Francesco Pomilio, Marina Torresi	Expertise in Food Safety and quality management	Twinning Project between LITHUANIA, HUNGARY, ITALY and BOSNIA AND HERZEGOVINA "EU's support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina" EuropeAid/166812/DD/ACT/BA. Training courses: - "Foodborne outbreak investigation": 8-12 May 2023, Mostar. Pomilio F., Torresi M, Cornacchia A, Iannetti L. - "Principles and techniques to perform HACCP audit for food inspectors (Practical site visit and training): 5-9 giugno 2023, Mostar; 12-16 giugno 2023, Banja Luka; 19-22 giugno 2023, Sarajevo. Pomilio F, Centorotola G., Di Marzio V, Centorame P, Iannetti L
Alessandra Cornacchia, Maria Luisa Danzetta, Francesco Pomilio	Expertise in Food Safety and quality management	European Twinning project on food safety funded by the EU with the Ministry of Agriculture and the Ministry of Education and Scientific Research of Madagascar "Appui au renforcement du dispositif de surveillance et de contrôle de la qualité et conformité sanitaire et phytosanitaire des produits agricoles et agroalimentaires à Madagascar"
Luigi Iannetti, Francesco Pomilio	Expertise in Food Safety and quality management	Webinar: "Training course on Practical methods for carrying out shelf life studies and verifying their quality, how to evaluate the shelf life of foods in relation to the risk of <i>Listeria monocytogenes</i> , the challenge test according to the EURL Lm 2021 guidelines and the ISO 20976-1:2019
Alexandra Chiaverini, Maria Luisa Danzetta, Fabrizia Guidi, Luigi Iannetti, Giacomo Migliorati, Francesco Pomilio, Marina Torresi	Expertise in Food Safety	Expert opinion to the Ministry of Health to conduct investigations relating to an outbreak of listeriosis from strain belonging to ST1_Cluster 291 including technical inspection at the food business operator identified as possible source of the outbreak. Expert opinion to the Ministry of Health to conduct investigations relating to an outbreak of listeriosis from strain belonging to ST20 including technical inspection at the food business operator identified as the source of the outbreak.

TOR7: SCIENTIFIC AND TECHNICAL TRAINING

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

Yes

The WOAAH 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 WOAAH Members and through specific capacity building initiatives. These activities are carried out in the framework of various projects upon different funding lines and other opportunities provided by international workshops and conferences. The WOAAH Member Countries mainly involved in these activities are those belonging to the following geographical areas: North Africa, eastern coast of Africa - Madagascar, 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 WOAAH, to personnel from WOAAH Members?

Yes

a) Technical visit : 5

b) Seminars : 4

c) Hands-on training courses: 5

d) Internships (>1 month) : 0

TYPE OF TECHNICAL TRAINING PROVIDED (A, B, C OR D)	CONTENT	COUNTRY OF ORIGIN OF THE EXPERT(S) PROVIDED WITH TRAINING	NO. PARTICIPANTS FROM THE CORRESPONDING COUNTRY
A	Technical visit under the EU Twinning Project MG 19 FED AG 01 21 Jumelage européen "Appui au renforcement du dispositif de surveillance et de contrôle de la qualité et conformité sanitaire et phytosanitaire des produits agricoles et agroalimentaires à Madagascar" Teramo, 13-17 November 2023	Madagascar	7
A	Twinning project : EU support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina Teramo, 23/27 January 2023	Bosnia and Herzegovina	11
A	OIE Twinning project on Food Safety between the Istituto Zooprofilattico Sperimentale dell' Abruzzo e del Molise and the National Reference. Food Safety Institute Laboratory of Azerbaijan Food safety Insitute, Teramo, 13-17 February 2023	Azerbaijan	2
A	RC project: Study on the prevalence of Apis mellifera parasitic diptera in Mediterranean regions and their involvement in hive mortality, Food and Veterinary Agency, Isernia, 03-07 July 2023	Kosovo	1
A	Training funded by the atomic Agency (IAEA) related to the diagnosis of priority diseases in Algeria with focus on Campylobacter diagnosis.	Algeria	2
B	Round table for sharing experiences about the WGS use in the One Health context (regional and international perspectives).	Italy	13
B	ERFAN Food Hygiene" - WG South Africa , March 2023	Namibia, Mozambico, Zambia, Zimbabwe, Italia	10
B	On line Synchronous training on campylobacteriosis and antimicrobial resistance within the ERFAN network.	Tunisia, Algeria, Mozambico, Namibia, Moroccco, Botswana, Zimbabwe, Libia	60
B	The results of the Current Research conducted by IZS-TERAMO (Year 2022). 6	Italy	74

June, 2023			
C	Round table for sharing experiences about the WGS use in the One Health context (regional and international perspectives).	Italy	52
C	Outbreaks management of food-borne diseases I Edition, Teramo, 19-20 October 2023	Italy	14
C	Outbreaks management of food-borne diseases II Edition, Teramo, 26-27 October 2023	Italy	15
C	The National Reference Laboratory for Campylobacter Teramo, 7 November, 2023	Italy	54
C	The National Reference Laboratory for Listeria monocytogenes Teramo, 8 November, 2023	Italy	66

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:

17

1. Aprea, G.; Del Matto, I.; Tucci, P.; Marino, L.; Scattolini, S.; Rossi, F. *In Vivo Functional Properties of Dairy Bacteria*. *Microorganisms* 2023, 11, 1787. <https://doi.org/10.3390/microorganisms11071787>
2. Boone I, D'Errico ML, Iannetti L, et al. 2023. *Catering of high-risk foods and potential of stored food menu data for timely outbreak investigations in healthcare facilities, Italy and Germany*. *Epidemiol Infect.* 2023;151. doi: 10.1017/S0950268823000468.
3. Bosica Serena, Alexandra Chiaverini, Maria Elisabetta De Angelis, Antonio Petrini, Daniela Averaimo, Michele Martino, Marco Rulli, Maria Antonietta Saletti, Maria Chiara Cantelmi, Franco Ruggeri, Fabrizio Lodi, Paolo Calistri, Francesca Cito, Cesare Cammà, Marco Di Domenico, Antonio Rinaldi, Paolo Fazii, Fabrizio Cedrone, Giuseppe Di Martino, Patrizia Accorsi, Daniela Morelli, Nicola De Luca, Francesco Pomilio, Giustino Parruti, Giovanni Savini. *Severe Streptococcus equi Subspecies zoonotic outbreak from Unpasteurized Dairy Product Consumption, Italy*. *Emerging Infectious Diseases* • www.cdc.gov/eid • Vol. 29, No. 5, May 2023. DOI: <https://doi.org/10.3201/eid2905.221338>
4. Cantelmi, M.C.; Merola, C.; Averaimo, D.; Chiaverini, A.; Cito, F.; Cocco, A.; Di Teodoro, G.; De Angelis, M.E.; Di Bernardo, D.; Auzino, D.; et al. *Identification of the Novel Streptococcus equi subsp. Zoonotic Sequence Type 525 in Donkeys of Abruzzo Region, Italy*. *Pathogens* 2023, 12, 750. <https://doi.org/10.3390/pathogens12060750>
5. Castelli, P., De Ruvo, A., Bucciacchio, A. et al. *Harmonization of supervised machine learning practices for efficient source attribution of Listeria monocytogenes based on genomic data*. *BMC Genomics* 24, 560 (2023). <https://doi.org/10.1186/s12864-023-09667-w>
6. Centorotola G, Ziba MW, Cornacchia A, et al. 2023. *Listeria monocytogenes in ready to eat meat products from Zambia: Phenotypic and genomic characterization of isolates*. *Frontiers in Microbiology*. 2023;14:1228726. doi: 10.3389/fmicb.2023.1228726.
7. D'Onofrio F, Schirone M, Papparella A, et al. 2023. *Stress adaptation responses of a Listeria monocytogenes 1/2a strain via proteome profiling*. *Foods*. 2023;12(11). doi: 10.3390/foods12112166.
8. D'Onofrio F, Schirone M, Krasteva I, et al. 2023. *A comprehensive investigation of protein expression profiles in L. monocytogenes exposed to thermal abuse, mild acid, and salt stress conditions*. *Frontiers in Microbiology*. 2023;14. doi: 10.3389/fmicb.2023.1271787.
9. Félix B, Capitaine K, Te S, et al. 2023. *Identification by high-throughput real-time PCR of 30 major circulating Listeria monocytogenes clonal complexes in Europe*. *Microbiology Spectrum*. 2023;11(3). doi: 10.1128/spectrum.03954-22.
10. Guidi F, Centorotola G, Chiaverini A, et al. 2023. *The slaughterhouse as hotspot of CC1 and CC6 Listeria monocytogenes strains with hypervirulent profiles in an integrated poultry chain of Italy*. *Microorganisms*. 2023;11(6):1543. doi: 10.3390/microorganisms11061543.
11. Marotta F, Janowicz A., Romantini R., Di Marcantonio L., Di timoteo F., Romualdi T., Zilli K., Barco L., D'Incau M., Mangone I., Cito, F., Di Domenico M., Pomilio F., Ricci L. and Garofolo G., 2023. *Genomic and Antimicrobial Surveillance of Campylobacter Population in Italian Poultry*. *Foods*, 12(15),
12. Midelet Graziella, BARRE Léna, ASSÉRE Adrien, LOMBARD Bertrand BRAUGE, Thomas, *In collaboration with a working group with a working group of representatives of National Reference Laboratories (NRLs) for Listeria monocytogenes as well as representatives of National Competent Authorities (CA) and food processors (FP) including Gabriella CENTOROTOLA and Francesco POMILIO. EURL Lm TECHNICAL GUIDANCE DOCUMENT on sampling the food processing area and equipment for the detection of Listeria monocytogenes Version 4 3 October 2023.*

13. Pomilio F, De Angelis M.E., Maggio F., *Listeriosi in Igiene dei processi alimentari Hoepli*, 2023, Milano Italia. ISBN 978-88-360-0983-1.
14. Schiavano GF, Guidi F, Pomilio F, et al. 2023. *Listeria monocytogenes* strains persisting in a meat processing plant in central Italy: Use of whole genome sequencing and in vitro adhesion and invasion assays to decipher their virulence potential. *Microorganisms*. 2023;11(7):1659. doi: 10.3390/microorganisms11071659.
15. Tirloni E., Centorotola G., Pomilio F., et al. 2023. *Listeria monocytogenes* in Ready to Eat (RTE) delicatessen foods: prevalence, genomic characterization of isolates and growth potential. Available at SSRN: <https://ssrn.com/abstract=4577890> or <http://dx.doi.org/10.2139/ssrn.4577890>.
16. Tirloni E., Centorotola G., Pomilio F., et al., 2023. *Listeria monocytogenes* in ready-to-eat (RTE) delicatessen foods: Prevalence, genomic characterization of isolates and growth potential. *International Journal of Food Microbiology*, <https://doi.org/10.1016/j.ijfoodmicro.2023.110515>
17. Ziomek M., Gondek M., Torracca B., Marotta F., Garofolo G., Wiczorek K., Michalak K., Fratini F. and Pedonese F., 2023. Occurrence of *Campylobacter* in Faeces, Livers and Carcasses of Wild Boars Hunted in Tuscany (Italy) and Evaluation of MALDI-TOF MS for the Identification of *Campylobacter* Species. *Foods (Basel, Switzerland)*, 12(4), pp. 778. doi:10.3390/foods12040778.

b) International conferences:

9

1. Battistelli N., Scattolini S., Acciari V. A., Di Lollo V., Olivieri S., Pomilio F., Migliorati G., D'Alterio N., Aprea G. Activity of bacteriophage endolysins Lys P100 and Lys LP 101 against *Listeria monocytogenes* in soft cheese. Poster communication, Session 7, Virus Of Microbes, 3-7 luglio 2023, Georgia. Poster presentation
2. Centorame P., Challenge test studies in the framework of Listeriapredict project. Workshop Recent updates on *Listeria monocytogenes*: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 April 2023 Teramo-CIFIV. Oral presentation
3. Centorotola G., New perspectives in the genomic characterisation of *Listeria monocytogenes*. Workshop "Recent updates on *Listeria monocytogenes*: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation
4. Chiaverini A., VI Gran Sasso International Forum. "Food Safety: present and perspectives in the era of genomics". Teramo 28-30 settembre 2023. Oral presentation
5. D'Onofrio F. Proteomic profiling of a virulent *Listeria monocytogenes* strain grown under several stress conditions. Symposium on *Listeria monocytogenes* in Foods within the project "Listeria Predict", 24-25 Maggio, 2023 Teagasc Food Research Centre, Dublin, Ireland. Oral presentation
6. D'Onofrio F., Proteomics and transcriptomics studies on *Listeria monocytogenes*. Workshop Recent updates on *Listeria monocytogenes*: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation
7. De Angelis E., Updates on *Listeria monocytogenes* detection. Challenges and future prospective. Workshop Recent updates on *Listeria monocytogenes*: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation
8. Garofolo G., Perspectives and challenges in accreditation of NGS-based method. 18th EURL-Campylobacter Workshop, September 26-27, 2023. On line, Oral presentation.
9. Torresi M., The *Listeria monocytogenes* ST155 Outbreak in Italy (August-October 2022). Workshop Recent updates on *Listeria monocytogenes*: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation

c) National conferences:

37

1. Centorotola G., Valutazione e mitigazione del rischio da agenti patogeni batterici e virali di origine alimentare in ambito nosocomiale e scolastico. I risultati della ricerca corrente condotta dall'Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise - anno 2022, 06 giugno 2023 Teramo-CIFIV. Oral presentation
2. Centorotola G., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "Validazione dei processi termici negli stabilimenti di prodotti alimentari", 8 novembre 2023, Teramo. Oral presentation
3. Di Romualdo R., "Studi di attribuzione *Campylobacter*", Giornata studio per Il Laboratorio Nazionale di Riferimento per *Campylobacter*, Teramo, 07/11/2023. Oral presentation
4. Di Romualdo R., "Challenge test - latte *Campylobacter*", Giornata studio per Il Laboratorio Nazionale di Riferimento per *Campylobacter*, Teramo, 07/11/2023. Oral presentation
5. De Angelis M.E., Torresi M., Ferrara M., Averaimo D., Bosica S., Costantini B., Rulli M., Sericola M., Sulli N.M., Pomilio F. Applicazione del MALDI-TOF per l'identificazione rapida di colonie sospette di *Listeria monocytogenes* e *Listeria spp.* in campioni con flora microbica mista. XXII Congresso Nazionale SIDILV, 11-13 ottobre 2023, Brescia. Poster presentation
6. Danzetta M.L., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "L'individuazione della sorgente in un focolaio di malattia trasmessa dagli alimenti", 8 novembre 2023, Teramo. Oral presentation
7. De Angelis E., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. IV Convegno Nazionale C.Re.Ta.M. "Tartarughe marine in Italia - Stato dell'arte e nuove frontiere". *Listeria monocytogenes* e *Listeria spp.* in tartarughe marine. Isolamento e caratterizzazione genomica", 04 ottobre 2023, Termoli. Oral presentation
8. De Angelis E., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "Curve di crescita dei ceppi di *Listeria monocytogenes* (dati preliminari)", 8 novembre 2023, Teramo. Oral presentation
9. De Angelis M.E., Torresi M., Ferrara M., Averaimo D., Bosica S., Costantini B., Rulli M., Sericola M., Sulli N.M., Pomilio F. "Uso del metodo MALDI-TOF per l'identificazione di *Listeria monocytogenes* e *Listeria spp.*". XXII Congresso Nazionale SIDILV, 11-13 ottobre 2023, Brescia. Poster presentation
10. De Angelis E., "Listeria: presente e futuro", Convegno Igiene degli alimenti: attualità e prospettive. Presentazione del volume *Igiene nei processi alimentari*", 16 novembre 2023, Teramo. Oral presentation
11. Garofolo G., *Campylobacter* EURL aggiornamenti, Il Laboratorio Nazionale di Riferimento per *Campylobacter*, Teramo, 07/11/2023. Oral presentation
12. Guidi F., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "La qualità del DNA da destinare al sequenziamento dell'intero genoma", 8 novembre 2023, Teramo. Oral presentation
13. Janowicz A., "Detection and investigation of healthcare-acquired and foodborne outbreaks: a genomics approach", Giornata di studio del Centro di Referenza Nazionale GenPat, 09/11/2023. Oral presentation
14. Leva M., "PFAS negli alimenti: l'esperienza dell'ISZ-Teramo", Giornata di studio Inquinanti Organici Persistenti alogenati negli alimenti, nei mangimi e nell'ambiente, 23 giugno 2023, Teramo. Oral presentation
15. Marotta F., Janowicz A., Di Timoteo F., Di Marcantonio L., Romantini R., Zilli K., Abass A., Romualdi T., Foschi G., Di Domenico M., Mangone I., Garofolo G., "Validazione di un workflow per la genotipizzazione di ceppi di *Campylobacter jejuni* e *Campylobacter coli* tramite Whole Genome Sequencing (WGS)", SIDILV XXII Congresso Nazionale, 11-13 Ottobre 2023. Poster presentation
16. Marotta F., "Studio di validazione del metodo di tipizzazione WGS per *Campylobacter jejuni* e *Campylobacter coli*", Giornata di studio per Il Laboratorio Nazionale di

Riferimento per *Campylobacter*, Teramo, 07/11/2023. Oral presentation

17. Marotta F., "Ring Test *Campylobacter*", Giornata di studio per Il Laboratorio Nazionale di Riferimento per *Campylobacter*, Teramo, 07/11/2023. Oral presentation
18. Pomilio F., Iannetti L., "Gestione di un focolaio: principali sistemi di allerta a livello nazionale ed Europeo". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
19. Pomilio F., Iannetti L., "Identificazione e segnalazione del focolaio e creazione di un gruppo di lavoro". Convegno Approccio One Health alle tossinfezioni alimentari 28-29 novembre 2023, Nuoro. Oral presentation
20. Pomilio F., Iannetti L., "Prime misure di controllo: ruoli e attività del dipartimento di prevenzione". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
21. Pomilio F., Iannetti L., "Determinazione della fonte di un focolaio: ruoli e attività dei S.V.". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
22. Pomilio F., Iannetti L., "Determinazione della fonte di un focolaio: attività del laboratorio". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
23. Pomilio F., Iannetti L., "Caratterizzazione dell'alimento e dei processi di produzione". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
24. Pomilio F., Iannetti L., "Attività di tracciabilità degli alimenti potenzialmente coinvolti". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
25. Pomilio F., Iannetti L., "Implementazione delle misure di controllo". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
26. Pomilio F., Iannetti L., "Esercitazione e presentazione dei risultati". Convegno Approccio One Health alle tossinfezioni alimentari 28-29 novembre 2023, Nuoro. Oral presentation
27. Pomilio F., Iannetti L., "Campionamento e analisi di alimenti e campioni ambientali". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
28. Pomilio F., Iannetti L., "Comunicazione dei risultati, elaborazione del report finale". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
29. Pomilio F., Iannetti L., "Implementazione delle misure di contenimento, attività di follow up". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
30. Pomilio F., Iannetti L., "Controperizia e controversia". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
31. Pomilio F., Iannetti L., "Presentazione di casi pratici". Convegno Approccio One Health alle tossinfezioni alimentari, 28-29 novembre 2023, Nuoro. Oral presentation
32. Radomski N., De Ruvo A., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria* "Gli algoritmi di machine learning per individuare la sorgente dei focolai", 8 novembre 2023, Teramo. Oral presentation
33. Torresi M., Luciani M., Iannetti L., L. monocytogenes: caratterizzazione, rintraccio della fonte e gestione del focolaio da ST155 del 2022. Evento on-line, Contaminanti microbiologici: *Listeria* e altri patogeni "emergenti". Strategie per prevenirli e individuarli. In_ormare, 18 maggio 2023. Oral presentation
34. Torresi M., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "Attività del LNR durante i focolai recenti", 8 novembre 2023, Teramo. Oral presentation
35. Torresi M., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Giornata studio per Il Laboratorio Nazionale di Riferimento per *Listeria*. "Comunicazioni da EURL e PTs", 8 novembre 2023, Teramo. Oral presentation
36. Tirloni E., Centorotola G., Pomilio F., Torresi M., Bernardi C., Stella S. *Listeria monocytogenes* in alimenti ready to eat (RTE) di gastronomia: prevalenza, caratterizzazione genomica, potenziale di crescita ed efficacia dell'impiego di batteri lattici come biopreservanti. XXXII edizione del Congresso Nazionale dei Medici Veterinari Igienisti (AIVI), 13-15 settembre 2023, Vibo Valentia. Poster presentation
37. Zilli K., Studio di un focolaio da *Campylobacter* mediante tipizzazione con spettroscopia FT-IR. XXII Congresso Nazionale SIDILV, Brescia, 11-13 ottobre 2023. Oral presentation

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

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PUBLICATIONS IN EFSA JOURNAL:

1. Butler F., K. Hunt, G. Redmond, et al., 2023. Application of novel predictive microbiology techniques to shelf-life studies on *Listeria monocytogenes* in ready-to-eat foods (*ListeriaPredict*). EFSA supporting publication 2023:EN-8418. 66pp. doi:10.2903/sp.efsa.2023.EN-8418.
2. The European Union One Health 2022 Zoonoses Report, EFSA Journal. 2023;21:e8442. <https://doi.org/10.2903/j.efsa.2023.8442>, efsa.onlinelibrary.wiley.com/journal/1831-4732

CHAPTERS IN BOOK:

3. Pomilio F, De Angelis M.E., Maggio F., *Listeriosi in Igiene dei processi alimentari* Hoepli, 2023, Milano Italia. ISBN 978-88-360-0983-1.

EURL GUIDELINES:

4. Bergis Hélène, Bonanno Ludivine, Asséré Adrien, Marie Polet, Toomas Kramarenko, Kristjan Soo, Francesco Pomilio, Luigi Iannetti, Gabriella Centorotola, Taran Skjerdal, Regina Heslin, Paul in't Veld. EURL Lm GUIDANCE DOCUMENT to evaluate the competence of laboratories implementing challenge tests and durability studies related to *Listeria monocytogenes* in ready-to-eat foods. Version 3 10/02/2023. https://food.ec.europa.eu/system/files/2023-02/biosafety_fh_mc_guidance-comp-labs.pdf
5. Midelet Graziella, BARRE Léna, ASSÉRE Adrien, LOMBARD Bertrand BRAUGE, Thomas, In collaboration with a working group with a working group of representatives of National Reference Laboratories (NRLs) for *Listeria monocytogenes* as well as representatives of National Competent Authorities (CA) and food processors (FP) including Gabriella CENTOROTOLA and Francesco POMILIO. EURL Lm TECHNICAL GUIDANCE DOCUMENT on sampling the food processing area and equipment for the detection of *Listeria monocytogenes* Version 4, 3 October 2023.

TRAINING PROVIDED AT INTERNATIONAL LEVEL:

6. Centorotola G., "Detection of *Listeria monocytogenes* in food and environmental samples" Webinar WOAHP Twinning Azerbaijan. Training activity on detection and characterization of *Listeria monocytogenes* and *Salmonella* spp. 23 febbraio 2023.
7. Chiaverini A., "Clustering of *Listeria monocytogenes* strains. Practical activities." Webinar WOAHP Twinning Azerbaijan. Training activity on detection and characterization of *Listeria monocytogenes* and *Salmonella* spp. Teramo, 24 febbraio 2023.
8. Cornacchia A., "Genomic characterization of *Listeria monocytogenes* by WGS approach" Webinar WOAHP Twinning Azerbaijan. Training activity on detection and characterization of *Listeria monocytogenes* and *Salmonella* spp. 23 febbraio 2023.

9. Danzetta M.L., "The clinical cases". Workshop to present and discuss the document "Foodborne and waterborne disease outbreaks: guideline for investigation and control". In Twinning project: EU support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina. (8-12 May 2023). On line, Oral presentation.
10. De Angelis E., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Progetto Listeria predict. New studies on Listeria monocytogenes: strain-to-strain interactions, proteomics and transcriptomics. Updates on Listeria monocytogenes detection with particular focus on strain-to-strain interactions. Challenges and future prospective, 11 maggio 2023, Teramo. Oral presentation
11. Iannetti L., The new ISO 2972:2 (Challenge tests to study inactivation potential and kinetic parameters). Workshop Recent updates on Listeria monocytogenes: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation
12. Iannetti L., Latest news from the EURL for Listeria monocytogenes: new guidance documents currently under processing. Workshop "Recent updates on Listeria monocytogenes: shelf life studies, growth under different environmental conditions and in presence of microbiological interactions", 18 aprile 2023 Teramo-CIFIV. Oral presentation
13. Pomilio F, Centorotola G., Di Marzio V., Centorame P, Iannetti L., Training course: Principles and techniques to perform HACCP audit for food inspectors (Practical site visit and training). In Twinning project: EU support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina. (5-9 giugno 2023, Mostar, 12-16 giugno 2023, Banja Luka; 19-22 giugno 2023, Sarajevo). Oral presentation
14. Pomilio F., Torresi M., Cornacchia A., Iannetti L., Training course: Foodborne outbreak investigation. In Twinning project: EU support to capacity building and gradual Union acquis alignment in the Food safety sector in Bosnia and Herzegovina (8-12 maggio 2023, Mostar). Oral presentation

TRAINING PROVIDED AT NATIONAL LEVEL:

15. Cornacchia A., Pomilio F., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Attività di tracciabilità degli alimenti potenzialmente coinvolti. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
16. Cornacchia A., Torresi M., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Identificazione e segnalazione del focolaio e creazione di un gruppo di lavoro. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
17. Danzetta M.L., Torresi M., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Attività in azienda: campionamento e analisi di alimenti e campioni ambientali. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
18. Iannetti L., Inattivazione termica di Listeria monocytogenes: validazione dei processi e challenge test secondo la nuova ISO 20976-2:2022. Evento formativo AIVI, "Sicurezza alimentare e ruolo dei patogeni emergenti: a che punto siamo?", 11 luglio 2023, Milano. Oral presentation
19. Guidi F., Persistenza di Listeria monocytogenes negli ambienti di produzione. Evento formativo UNITE per scuola di specializzazione veterinaria, 21 aprile 2023, Teramo. Oral presentation
20. Guidi F., Whole Genome Sequencing (WGS): la nuova era della tipizzazione genomica dei patogeni alimentari. Evento formativo UNITE per scuola di specializzazione veterinaria, 17 aprile 2023, Teramo. Oral presentation
21. D'Onofrio F., Schirone M., L. monocytogenes: meccanismi di difesa e adattamento. Nuove strategie di prevenzione. Evento on-line, Contaminanti microbiologici: Listeria e altri patogeni "emergenti". Strategie per prevenirli e individuarli. In formare, 18 maggio 2023. Oral presentation
22. Pomilio F., Centorotola G., "Listeria monocytogenes: il problema dei cloni persistenti". Focolai di Listeriosi alimentare: aspetti normativi, epidemiologici e gestione del rischio. Evento formativo organizzato da Asl Bari, ordine medici veterinari di Bari e dell'associazione Italiana Veterinari Igienisti, 23 maggio 2023, Bari. Oral presentation
23. Pomilio F., Iannetti L., Danzetta M.L., "Misure di controllo del focolaio con particolare riferimento alle attività del servizio veterinario di igiene della produzione, trasformazione, commercializzazione, conservazione e trasporto degli alimenti di origine animale e loro derivati (SVIAOA)" – parte 1. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
24. Pomilio F., Iannetti L., Danzetta M.L., "Misure di controllo del focolaio con particolare riferimento alle attività del servizio veterinario di igiene della produzione, trasformazione, commercializzazione, conservazione e trasporto degli alimenti di origine animale e loro derivati (SVIAOA)" – parte 2. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
25. Pomilio F., Iannetti L., Danzetta M.L., "Determinazione della fonte di un focolaio: ruoli e attività del SVIAOA". Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
26. Pomilio F., Iannetti L., Danzetta M.L., "Caratterizzazione dell'alimento e dei processi di produzione". Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
27. Pomilio F., Listeria monocytogenes: lo strumento del challenge test. Focolai di Listeriosi alimentare: aspetti normativi, epidemiologici e gestione del rischio, evento formativo organizzato da Asl Bari, ordine medici veterinari di Bari e dell'associazione Italiana Veterinari Igienisti, 23 maggio 2023, Bari. Oral presentation
28. Torresi M., Cornacchia A., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Determinazione della fonte di un focolaio: attività del laboratorio. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
29. Torresi M., Danzetta M.L., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Gestione di un focolaio: principali sistemi di allerta a livello nazionale ed Europeo. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
30. Torresi M., Danzetta M.L., Istituto Zooprofilattico Sperimentale dell'Abruzzo e del Molise. Comunicazione dei risultati, elaborazione del report finale. Corso di formazione Gestione di focolai epidemici di malattie a trasmissione alimentare, I edizione 19-20 ottobre 2023, II edizione 26-27 ottobre 2023, Teramo. Oral presentation
31. Torresi M., Focolai di listeriosi in Italia nel 2022. Evento formativo AIVI "Sicurezza alimentare e ruolo dei patogeni emergenti: a che punto siamo?", 11 luglio 2023, Milano. Oral presentation

THESIS DISSERTATION:

32. Dissertation "Genomics studies for Listeria monocytogenes in food processing environments. College of Pavia, Department of Biology and Biotechnology "L. Spallanzani". Speaker: Dott. Brenda Silli.

RELEVANT WEBSITES:

- National Reference Laboratory for Listeria monocytogenes. <https://www.izs.it/IZS/Engine/RAServePG.php/P/256410010520/L/1>
National Reference Centre for Whole Genome Sequencing of microbial pathogens: database and bioinformatic analysis.

https://www.izs.it/IZS/Centres_of_excellence/National_Centres/CRN_-_Sequenze_Genomiche

National Reference Laboratory for *Campylobacter*: https://www.izs.it/IZS/Centres_of_excellence/National_Centres/LNR_-_Campylobacter

SINVSA (National Veterinary Information System for Food Safety): accessible through the National Veterinary Information System VETINFO <http://www.vetinfo.sanita.it>

SINVSA Export USA: accessible through the National Veterinary Information System VETINFO <http://www.vetinfo.sanita.it>

SINVSA Export to other Third Countries: accessible through the National Veterinary Information System VETINFO <http://www.vetinfo.sanita.it>

SEAP (Information system for the epidemiological surveillance of food pathogens): <https://sorveglianza.izs.it/seap/common/reset.do?locale=it>

SIPSA: accessible through the National Veterinary Information System VETINFO <http://www.vetinfo.sanita.it>

Prove interlaboratorio: <http://proveinterlaboratorio.izs.it/>

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 WOAHC 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: