D1.15 Annual Work Plan for the fifth year

WP1 Coordination

Responsible Partner: ANSES

Contributing partners: all partners

GENERAL INFORMATION

European Joint Programme full title	**Promoting One Health in Europe through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards**
European Joint Programme acronym	**One Health EJP**
Funding	**This project has received funding from the European Union's Horizon 2020 research and innovation programme under Grant Agreement No 773830.**
Grant Agreement	**Grant agreement n° 773830**
Start Date	**01/01/2018**
Duration	**60 Months**

DOCUMENT MANAGEMENT

Title OHEJP deliverable	**D1.15 Annual Work Plan Year 5**
WP and task	**WP1 / Task 1.2**
Leader	**ANSES**
Other contributors	All partners
Due month of the deliverable	**M45**
Actual submission month	**M46**
Revised version	
Type **R: Document, report** **DEC: Websites, patent filings, videos, etc.; OTHER**	R
Dissemination level **PU: Public (default)** **CO: confidential, only for members of the consortium (including the Commission Services).**	**PU** **See updated Grant Agreement**
Dissemination **Author's suggestion to inform the following possible interested parties.**	OHEJP WP 1 ☐ OHEJP WP 2 ☐ OHEJP WP 3 ☐ OHEJP WP 4 ☐ OHEJP WP 5 ☐ OHEJP WP 6 ☐ OHEJP WP 7 ☐ Project Management Team ☒ Communication Team ☒ Scientific Steering Board ☒ National Stakeholders/Program Owners Committee ☒ EFSA ☐ ECDC ☐ Other international stakeholder(s): …… Social Media: **Other recipient(s):** REA Officers and EC Steering Group

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1 Glossary

ASM: Annual Scientific Meeting
AWP: Annual Work Plan
CaM: Communication workshop and Media training
CPD: Continuing Professional Development
CT: Coordination Team
ESAB: External Scientific Advisory Board
FOC: Free of Charge
IM: Integrative Mentoring
JIP: Joint Integrative Projects
JRP: Joint Research Project
OHEJP: One Health European Joint Programme
PL: Project Leader
PMC: Programme Managers Committee
PMT: Project Management Team
POC: Programme Owners Committee
REA: Research Executive Agency
SPR: Summary Progress Report
SS: Summer School
SSB: Scientific Steering Board
ST: Support Team
STIM: Short Term Integrative Missions
STM: Short Term Mission
WS: Workshop

2 Coherence with annex 1

2.1 AWP objectives for month 49 to 60 (year 2022)

2.2 Expected impacts (each WP to provide a short description of the impact expected)

The set of activities described in the Annual Work Plan (AWP) from month 49 to 60 will contribute towards the implementation of the fifth year of the OHEJP, initially foreseen as its final year. With a very likely request of extension of the OHEJP duration beyond 2022, some final activities will be implemented in Y6 instead of Y5, but whatever the case, Y5 will result in the finalisation of the Joint Research Projects and Joint Integrative project and in implementation of an enhanced dialogue with stakeholders and of a strategic reflection on the sustainability of OHEJP.

2.2.1 WP1

In the fifth year, the Coordination Team (P01-Anses and P04-Sciensano) assisted by the Project Management Team will ensure that the AWP Y5 of the fifth year is correctly implemented. The CT will manage both the technical and financial reporting, of the fourth year to the Research Executive Agency. The Support Team will support the organisation of PMT, PMC, SSB, POC and ESAB meetings. WP1 will pursue the effort initiated in Year 4 to foster an impact-oriented approach of the governance meetings and make them an effective tool to disseminate scientific outputs and outcomes and to demonstrate the impact of the EJP One Health on national and international stakeholders' activities. The website and

social media will be regularly updated and the project results will be disseminated both within the consortium, the European and international scientific community and the wider public.

2.2.1.1 Expected Communication Impacts:

The continued development and implementation of the Communication Strategy in Year 5 will ensure that the progress and outcomes of the OHEJP are effectively disseminated both internally and externally to the consortium and stakeholders. The key impacts expected in Year 5 are as follows:

- Regularly updating the OHEJP website with news, events and information will ensure that all of the up to date information is available for those internal and external to the consortium. This will subsequently encourage collaboration and involvement in the OHEJP events and funding opportunities to aid sustainability. Gradually, more of the links on the website will be moved from documents stored locally on the website, to links that are on Zenodo- a sustainable open access repository.

- Further increasing the audience reach and engagement levels on the OHEJP social media channels will result in improved dissemination of OHEJP research and outcomes. This will have a significant positive impact on dissemination as we can reach individuals across the globe by tailoring messages and content to suit audiences.

- The success of the OHEJP social media accounts, the traffic to the OHEJP website and the success of newsletters will continue to be monitored regularly, which allows the Communications Team to monitor the success of the Communication Strategy and determine new and improved routes for dissemination.

- Sharing the Dissemination Information Pack, which includes documents such as the Communication Strategy, Dissemination Procedure and Publication Policy, will support the OHEJP consortium and aid in improving the dissemination of outcomes. Creating documents that are manageable and contain clear, descriptive infographics are important in supporting consortium members.

- Strengthening collaborations with all OHEJP Stakeholders will support better dissemination of outcomes. For example the Communications Team attends Stakeholder Committee meetings which encourages direct communication with stakeholders, the Communications Team directly engages with stakeholder's social media accounts and collaborates with WP5 to share key information and use the information from the WP5 Scanning Documents to keep up to date with stakeholder activities.

- The internal and external newsletters will also improve the internal and external communication from the OHEJP and ensure that all stakeholders are aware of our progress and achievements on a regular basis.

- The Annual Report from 2021 will be published in Year 5 and will showcase all of the OHEJP achievements from Year 4. This document will be disseminated to stakeholders and both those internal and external to the OHEJP. This will help promote the OHEJP and our research.

- Effective communication of OHEJP progress, news, events, funding opportunities and Education and Training events will create a European One Health community of scientists who are experts in the One Health field. The use of our social media platforms and increasing our followers and engagements will also contribute to developing this community of scientists, stakeholders and the general public that have a been interest and passion for implementation of the One Health concept.

- The Communication Team will work with all of the OHEJP Work Packages to ensure that our research outcomes and activities are effectively communicated with policy makers across the EU. This will be a

multifaceted approach and will require an internal network, including the CCPs, within the consortium to ensure that the impact of our work is resulting in translation of science to policy.

- Continued work to strengthen the visibility of the OHEJP brand and disseminate outcomes will pave the way for sustainability of the OHEJP outcomes beyond the end of the OHEJP.

2.2.2 WP2

The final deliverables of WP2 (D2.8. and D2.9) will be delivered by the end of Y4. In Y5 WP2 will continue to monitor relevant scientific developments and provide input for the development of the strategic research and innovation agenda (SRIA) in WP7. Furthermore, the web based database of relevant EU research projects and related initiatives will be updated.

2.2.3 WP3

As in former years, the Joint Research Projects (still 13 in Y5) will produce deliverables that not only advance science in the domains of foodborne zoonoses, antimicrobial resistance and emerging threats, but will also contribute to the components of the preparedness logic: propose surveillance systems, laboratory methods and capacity, data for risk assessment and communication, and intervention. As such, the JRP produce impact by producing outputs that can be useful for the laboratories, the risk assessors and the risk managers.
The Annual Scientific Meeting in 2022, planned in Italy, will contribute to consolidating the One Health network by bringing together researchers from the various One Health EJP projects and by bringing them in context with young and experienced researchers outside the EJP, thus enforcing the One Health EJP consortium, also at the longer term.

2.2.4 WP4

During Y4 two JIPs, ORION and COHESIVE came to an end. The outcomes have continuously been disseminated during the project period and will be followed-up by additional dissemination activities during Y5 for example by presentations at scientific conferences and to national mirror groups. Reports will be prepared and provided by the OHEJP Communication Team. Activities directed to Stakeholders will be managed by OHEJP WP5. Further dissemination to additional OHEJP partners will be possible via Short Term Integrative Missions (STIMs) or Integrative Mentoring (IM), activities that can be applied for in WP4, depending on the COVID-19 situation. Both finished JIPs have fed into the Surveillance and Information Sharing Operational Tool (SISOT) developed by the Tripartite. The Project Leader of COHESIVE will participate in the piloting of SISOT in Europe. There is a potential for additional tools developed in the OHEJP to feed into the final SISOT.

The ongoing JIPs continue the work in close contact with the Stakeholders. Reference material for national reference laboratories and proficiency testing will be provided by CARE, making well characterized bacterial strains available. OH-HARMONY-CAP will assist in finding the most appropriate laboratory protocols to detect common zoonotic pathogens (best practice) and make harmonized protocols accessible. MATRIX will continue the efforts to support the One Health harmonization between institutes in Public Health, Animal Health and Food Safety. This project builds very much on the results from ORION and COHESIVE. One of the tasks for the newest JIP, COVRIN, is to study the transmission mechanisms for viruses, especially SARS-CoV2, between species and gain knowledge about how species barriers can be crossed. In addition to the original project partners, new partners are joining all ongoing JIPs making the impact even larger, since more partners are directly involved in the project activities.

WP4 supports the JIPs in various activities. One of these activities is to assist in the dissemination of knowledge generated within the projects. To facilitate the communication between projects, JRPs and JIPs Thematic Integrative Meetings are arranged and one such meeting is foreseen for late Y4 or early Y5. In this way both knowledge and experience can be shared. Many of the project activities also have direct impact, since the work is performed in close collaboration with e.g., national authorities or diagnostic laboratories. All data produced in the projects are described and can be accessed by information provided in the final Data Management Plans (DMPs), which at the end of the projects will be uploaded to Zenodo. Open data in the DMPs are accessible already during the lifetime of the projects.

The concept with Cogwheel workshops for sharing experiences with other ongoing EU initiatives has been very well received. In this way knowledge can be transferred between projects and overlaps avoided. All the Cogwheel workshops planned for in the original proposal have been performed.

A Simulation Exercise open for all OHEJP partners is planned for Y5. Both ECDC and EFSA take part in the planning of the exercise, as will FAO, WHO and OIE. During this exercise, the OHEJP institutes will be able to test the One Health capability, capacity, and interoperability in Public Health, Animal Health and Food Safety on a national level. Evaluation of the outcomes will be performed both nationally and on a OHEJP level and the outcomes of the OHEJP will be available to support the development of the One Health aspects of collaboration between institutes.

2.2.5 WP5

During the fifth year, WP5 “Science to policy translation” will follow the established procedures for an efficient information flow to and from national, European and international stakeholders. In particular, given the approach of the end of the OHEJP, it will ensure that output of research and integrative activities reaches national, EU and international stakeholders in a timely and targeted manner, focusing on closing the identified knowledge gaps, as well as fulfilling needs for scientific support. To identify said knowledge gaps, WP5 will be kept up to date with the EU key stakeholders’ needs mainly by direct communication (the Stakeholders Committee Meeting being the main tool), complemented indirectly via scanning of stakeholders’ published documents. Efficient dialogue and regular scanning of stakeholders’ documents will also contribute to avoid any duplication of work between OHEJP, stakeholders and other EU funded initiatives.
WP5 will continue to ensure that stakeholders have access to output and metadata produced in the OHEJP by curating the One Health EJP Outcome Inventory (OHOI) and, in collaboration with WP4, the Data Management Plan (DMP) reader. These tools, in parallel with forms of targeted dissemination, make OHEJP data available for the use of national, European and international risk assessment activities.
One of the important elements of targeted dissemination will be dissemination workshops, to be organised in collaboration with WP4, WP3 and WP6. These workshops are targeted to policy/decision makers, and focus on specific topics identified by the stakeholders themselves for being of particular interest.
Outcomes of WP5 activities will also inform other work packages in the drafting of the Strategic and Integrative Research Agenda, depicting the sustainability of the OHEJP.
Through the actions described in the AWP, WP5 will also depict complementarity between activities inside the consortium and outside, supporting potential collaborations and interactions, and avoiding duplication of work.

2.2.6 WP6

In the fifth and final year, WP6 will continue to support and monitor the progress and dissemination activities of the PhD projects through submission of their project deliverables and publications following

the appropriate dissemination procedure and scientific publication policy. WP6 will support the PhD projects with completion of their 9-month reports and final thesis reports.
WP6 will ensure PhD candidates will participate at the Annual Scientific Meeting in a dedicated oral presentation session for OHEJP PhD projects and the Three Minute Thesis competition to showcase their projects and report on the results of their scientific research. WP6 will also continue to actively encourage PhD candidates to join other students, junior and senior researchers and professionals attending or participating in the remaining WP6 activities and other OHEJP activities to expand their professional network and build on the collaborative interactions available.
WP6 will monitor and report on the progress of the STMs funded to take place in the fifth year, along with the missions that have been postponed from the third and fourth years of the OHEJP due to COVID-19. WP6 will work with the communications team to convey the main outcomes of the missions and testimonials from the awardees on the OHEJP website.
In addition, WP6 will also oversee and support the organisation of the following events in the fifth year, which were selected in the fourth year: the fourth and final ASM Satellite Workshop, Summer School, and the third and fourth CPD modules. The organisation, successes and evaluation of the event will be reported in the deliverable reports that are submitted.
In the fifth year, the following WP6 deliverables will be submitted: D6.13, D6.14, D6.15, D6.16, D6.17, D6.18, D6.19, D6.20 and D6.22.
The WP6 and Communications team will work together to identify new and improved ways of disseminating the successes of Work Package 6 and to increase the engagement when disseminating PhD scientific research progress and collaborative interactions by fostering a diverse and more engaging strategy through the OHEJP's communication channels both to internal and external target audiences.

2.2.7 WP7

WP7 work will elaborate ways forward for the long term sustainability of OHEJP, in close collaboration with WP2 and WP5, and taking into account the scenario provided by Horizon Europe (OH issues split in different partnerships).

In particular, WP7 activity will impact on the following issues renewal, broadening and strengthening of OHEJP goals through the capitalization of stakeholders inputs and the use of gap analysis, the OHEJP SRIA as a tool for long-term sustainability, exploring opportunities among partnerships and calls of Horizon Europe and other funding possibilities within the new EU Green Deal assessing opportunities and boundaries for OH institutionalization in the EU and EU Member States.

2.3 Correspondence with the description of work – Annex 1

2.3.1 WP1

WP1 work will be dedicated to supervision of the overall activities undertaken within the OHEJP and the reporting activities, namely Periodic Report of the forth year, Summary Progress Report the fifth year.

Financial follow-up of activities will be of utmost importance in the fourth year of implementation in order to ensure a good budgetary trajectory for the last year of the project allowing to have spent up to the maximum grant amount at the end of the OHEJP. The ST will also prepare the Fifth Amendment to the Grant Agreement.

Organisation support for the periodic meetings of the governance bodies as well as the Annual Scientific Meeting will be provided**.**

2.3.2 WP2

The final deliverables of WP2 (D2.9 and D2.10) will be delivered by the end of Y4. In Y5 WP2 will continue to monitor relevant scientific developments and provide input for the development of the strategic research and innovation agenda (SRIA) in WP7. Furthermore, the web based database of relevant EU research projects and related initiatives will be updated.

2.3.3 WP3

The fifth year is entirely dedicated to the monitoring of the ongoing Joint Research Projects, now only those from the second round. This follow-up will lead to the fourth periodic JRP report (D3.18). There are no JRP ending at the end of 2021, and therefore no evaluations of final reports are expected, unless we encounter isues with the evaluation of earlier reports (for instance, due to unavailability of scientific or 'end user' evaluators.
The fourth Annual Scientific Meeting will be held in Orvieto in Italy and the abstract book will be delivered as D3.19.

2.3.4 WP4

WP4 will continue to support the JIPs, to monitor the project progress and to take part in project activities. External evaluators will be recruited for JIPs finishing in Y5. The simulation exercise will be executed and evaluated. The continuous management and updates of JRP and JIP Data Management Plans will be supported and projects ending during the year will have their final DMPs evaluated and uploaded to Zenodo. Dissemination activities in finished and on-going JIPs will be stimulated and supported. In collaboration with WP5 dissemination workshops directed towards Stakeholders will be planned and performed. Contribution to Summary Progress report and Final report. Final reports from the finished JIPs will be uploaded to Zenodo. If possible, there will further possibilities for the dissemination of project outcomes by Short Term Integrative Missions and Integrative Mentoring activities. The Report on evaluation of first call JIPs D4.24 will be delivered in M54 (originally scheduled for M48). The periodic report on ongoing JIPs D4.27 will be delivered in M51.

2.3.5 WP5

During the fifth year, the actions foreseen in WP5 support the end of the OHEJP, and focus on targeted dissemination of results and depiction of how OHEJP activity close stakeholders' knowledge gaps. This is to be achieved only by smooth communication between the OHEJP and various stakeholders. The stakeholder committee reached its optimal form in year four, and the two Stakeholders Committee Meetings (SCMs) of the fifth year will mostly focus on dissemination of results based on stakeholders identified needs. OHEJP will support consideration of OHEJP results in the stakeholders' policies and activities. To link the stakeholders' identified needs with the activity of the OHEJP, WP5 will disseminate results of research and integrative activities following tailored approaches to maximize efficient uptake. The two major activities to reach this goal will be the dissemination workshops and the stakeholders forum. The latter will be organised towards the end of the consortium, therefore either in Y5 or, if the OHEJP extension will be granted, early in Y6. Beside these initiatives, WP5 will keep its other traditional activities in place: the aforementioned organisation of two SCMs, writing of two targeted reports to Key EU Stakeholders, writing of ad hoc thematic reports, curation of the OHOI and of the DMP, supporting other WPs in dissemination and sustainability activities, and overall liaising with stakeholders' organisations.

2.3.6 WP6

In the fifth and final year, WP6 will continue to support and monitor the progress and dissemination activities of the PhD candidates and their projects through submission of their project deliverables and publications. WP6 will ensure that the PhD deliverables submission, dissemination, and reporting procedures are adhered to, along with the scientific publication policy. WP6 will support the PhD projects with completion of their 9-month reports and final thesis reports which inform the Summary Progress Report Y5, and D6.18- thesis or final thesis reports of 16 PhD studentships. WP6 will continue to work closely the communications team to support the PhD project outputs, outcomes, tools, reports, and publications are disseminated to the appropriate target audiences in a timely fashion, and in an engaging and suitable format for the target audience.

PhD candidates will take part in the final 3MT PhD competition at the Annual Scientific Meeting to showcase their projects and report on the results of their scientific research. In addition, PhD candidates will be asked to give an oral presentation of their scientific research in a session dedicated to the OHEJP PhD scientific research. PhD candidates will continue to be encouraged to join other students, junior and senior researchers and professionals attending or participating in the remaining WP6 activities and other OHEJP activities towards building the next generation of 'One Health' researchers. Through these opportunities, PhD candidates will have the opportunity to expand their professional network and build on the collaborative interactions available.

WP6 will monitor the progress of the Short-Term Missions funded to take place in the fifth year, along with the missions that have been postponed from the third and fourth years of the OHEJP due to COVID-19. WP6 will work with the communications team to convey the main outcomes of the missions and testimonials from the awardees on the OHEJP website through visually attractive branded case studies. The deliverable D6.20 will be submitted in M60 and will contain the reports of all the missions. This will be uploaded on Zenodo and disseminated on our website and the OHEJP internal and external communication channels.

In addition, WP6 will also oversee and support the organisation of the following events in the fifth year, which were selected in the fourth year: the fourth and final ASM Satellite Workshop, Summer School, and the third and fourth CPD modules. All selected local organisers are informed of the roles and responsibilities of the local organising team, WP6 team and Communications Team to market and deliver the event successfully through a guidance document prepared by WP6 which is regularly evaluated and updated after each event.

The WP6 and Communications team will continue to work together to identify new and improved ways of disseminating the successes of WP6 not only to our internal target audiences, but also to our external target audiences such as the external scientific advisory board, stakeholders, programme owners and researchers outside our consortium. In addition, the two teams will collaborate their efforts to increase the engagement when disseminating PhD scientific research progress by fostering a diverse and more engaging strategy through the OHEJP's communication channels.

In the fifth year, the following WP6 deliverables will be submitted: D6.13, D6.14, D6.15, D6.16, D6.17, D6.18, D6.19, D6.20 and D6.22.

2.3.7 WP7

In the fifth year WP7 will complete and finalize the analysis of stakeholders´ needs and expectations through the accomplishment of the AMR and OH modules, in close interaction with WP5 (science-to-policy transfer) and WP2 (as regards gap analysis and new, unmet research needs). The sustainability

plan will adapt to the developments of the Horizon Europe Programme, where OH issues are split into different partnership: AMR, Animal Health and Welfare, Food Safety from Farm to Fork and Pandemics. Upon comments by PMT, Stakeholders committee, ESAB and SSB WP7 will finalize the draft SRIA into a final SRIA for OH. The SRIA will consider also the exploitation and strengthening of MedVetNet as a possible connecting network among OH institutions.

In parallel, WP7 will finalize its plan of collaboration with WP2, in order to assess the new opportunities for OHEJP sustainability provided by Horizon Europe and Partnerships, as well as the drivers that modulate the demands of stakeholders.

Finally, the PhD project SUSTAIN will provide an analysis of boundaries and opportunities for institionalization of OH.

2.4 Annual Work Plan

2.4.1 Detailed work description

2.4.1.1 Annual work plan activities

2.4.1.1.1 WP1-Coordination and Management

Set of activity	**WP1- Coordination and Management**				**Lead Beneficiary**				**P01-Anses**
					Deputy Lead Beneficiary				**P04-Sciensano**
Start month: M1					**End month: M60**				
Annual period of the OHEJP the project description applies: M49-M60 (Y5)									
Participant	**1**	**2**	**4**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
	Anses	**Ages**	**Sciensano**	**NDRVMI**	**SZU**	**VRI**	**BfR**	**FLI**	**RKI**	**DTU**
PM	**47**	**0,50**	**5,00**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**
Participant	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**
	SSI	**UT**	**VFL**	**INIA**	**UCM**	**MVNA**	**INRA**	**IP**	**APHA**	**PHE**
PM	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**		**0,50**	**0,50**	**0,50**	**0,50**
Participant	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**
	UoS	**OKI**	**NUIG**	**TEAGASC**	**ISS**	**IZSAM**	**IZSLER**	**RIVM**	**WbvR**	**FHI**
PM	**30,00**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**
Participant	**33**	**34**	**35**	**36**	**37**	**39**	**40**	**41**	**42**	**43**
	NVI	**PIWET**	**INIAV**	**INSA**	**IISPV**	**SLV**	**FOHM**	**SVA**	**NMVRVI**	**ISCIII**
PM	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**	**0,50**
Participant	**44**	**45**	**46**	**47**						
	BIOR	**RUOKA**	**THL**	**NEBIH**						
PM	**0,50**	**0,50**	**0,50**	**0,50**						

Objectives

T1.1: To carry out the EC contractual obligations regarding legal, financial and administrative management and coordination of the EJP.
T1.2: To ensure efficient project management
T1.3: To organize EJP management meetings of all the governance and management bodies of the EJP:
T1.4: To set up and put in place and manage efficient communication tools

Description of programmed activities

Task 1.1: Management of EC contractual obligations

The Coordination Team (CT) will supervise the preparation and submission of the deliverables due from M49 to M60 to the Research Executive Agency (REA). At the beginning of the period, the CT will carry out the annual technical and financial reporting. In addition, the CT will coordinate the preparation, compilation and submission to the EC of the Summary Progress Report (SPR) for fifth year. At the end of the period, the Support Team will achieve the fifth amendment to the Grant Agreement.

Task 1.2 Project management

The Coordination Team will exchange on a weekly basis via teleconferences to ensure that administrative, financial and contractual requirements are met. The CT and the PMT will have monthly teleconference to ensure a smooth management and coordination of the WP activities. The CT will also regularly liaise with the REA project officers and report any issue that may arise.

Task 1.3: Organisation of EJP management and governance meetings

The ST will ensure the organisation of all the project governance bodies meetings in regards to the identified planning. There will be 2 SSB, 4 PMT, 1 POC and 1 PMC meetings organised.

Task 1-4: Communication tools

Subtask 1.4.0: Communication Groups:
Maintain and strengthen working relationships with the CCP network. This will be established by encouraging increased interaction between CCPs and the Digital Communications Officer with regard to social media campaigns. This has worked well in previous years. Additionally, requesting that CCPs copy in the Communications Mailbox during their dissemination encourages CCP involvement and also allows the Communications Team to monitor the progress of dissemination.

Subtask 1.4.1 Web site/interface:
The website is the main information hub of the OHEJP and will continue to be improved and developed throughout the fifth year. Sustainability of the website will be a key focus in the fifth year as the website needs to exist two years after the end of the One Health EJP. The Communications Team will collaborate closely with the Med-Vet-Net-Association with respect to sustainable activities and associated responsibilities such as this. Gradually, many of the links on the website will be moved from documents stored locally on the website, to links that are on Zenodo- a sustainable open access repository. Furthermore, the Communications Team will work with web developers to ensure that the security and stability of the site are maintained after the fifth year. Ensuring the site is more secure, stable and requires little maintenance is key to ensuring the legacy of our research on the site.

Subtask 1.4.2 Internal communications-
Newsletters: The Consortium Newsletter will be disseminated quarterly to the consortium members. The quarterly newsletters will provide updates of OHEJP events, meetings, research, funding

opportunities and any other information suggested by other consortium members or the Communications Team. Each newsletter will be sent using MailChimp as this allows the success of each newsletter to be monitored. These newsletters will also be made available on the OHEJP website under "Newsletters" and advertised on the OHEJP social media accounts. The External Newsletters will be disseminated bi-annually and sent to consortium members and to the OHEJP external mailing list (which is generated on the OHEJP website). External newsletters will be targeted to a wider audience, including the general public. Additionally, D1.16- report on internal and external newsletters will be submitted.

Subtask 1.4.3 External Communications-Press Releases:
Press releases for OHEJP events will be published on the OHEJP website and advertised on the social media platforms. Press releases for the ASM and Work Package 6 activities will be the responsibility of the hosting institute, however the Communications Officer can assist if requested and will facilitate this information being disseminated by the OHEJP.

Subtask 1.4.4 External communications- Professional Social Networks:
The OHEJP social media platforms will continue to grow, and this growth will be monitored against KPIs in the Communications Strategy to ensure we are meeting pre-determined goals. The key objective for the social media networks is to increase the number of followers, impressions and engagements with our content. This will work towards creating a One Health Community on social media and reaching a global audience. Advertising and live tweeting of One Health EJP events such as the ASM, meetings, events and funding opportunities will raise the profile of the One Health EJP and encourage engagement online.

Subtask 1.4.5 Special issue on One Health-Zoonoses for a scientific journal:
This will be completed in the fifth year with the assistance of PMT and the OHEJP Project Leaders.

Subtask 1.4.6 External communications: Merchandise and branding:
Continuing to strengthen the brand will be essential in the fifth year as this will play a significant role in the sustainability of the OHEJP at the end of its final year. The Communications Team will continue to work closely with all consortium members to ensure that significant outcomes are disseminated using branded interactive pdf documents that can continue to be disseminated by OHEJP stakeholders to ensure the legacy lives beyond the five year programme. The OHEJP ASM 2022 will be an excellent platform to showcase our consortium and all outcomes to a global audience. OHEJP merchandise is available to all consortium members to support events, and it will be important in the fifth year to ensure that all members are aware of this.

Subtask 1.4.7 Annual and final report: The annual report for Year 4 and final OHEJP report will be completed in Year 5. Although the final report may be completed in the extension period for the OHEJP if this in granted.

Task 1.5 Ethics

Task 1.6 Declaration of Cofund
N/A

Deliverables

Ref	Title	Due month
D1.16	Annual report on the internal and external newsletter produced during the fourth year	M49
D1.17	Complete version of annual report for stakeholders n°4	M53
D1.18	Summary progress report year 5	M57

D1.19	Annual report on the internal and external newsletter produced during the fifth year	M57
D1.20	Complete version of annual and final reports for stakeholders n°5	M60
D1.21	Submit report on sustainability of website	M60
D1.22	Submit a special issue on One Health to a relevant journal	M60
D1.26	Ethical review report for Y4	M50
D1.27	Ethical review report for Y5	M60
Milestones		
Ref	**Title**	**Due month**
MS10	SSB Meeting n°9	M56
MS11	SSB Meeting n°10	M60
MS16	PMC/POC/ESAB & SC Annual meeting n°5	M57

2.4.1.1.2 WP2-Strategic Research Agenda

Set of Activity	**WP2–Strategic Research Agenda**			**Lead Beneficiary**			**P30-RIVM**		
				Deputy Lead Beneficiary			**P17-UCM**		
Start month: M1				**End month: M60**					
Annual period of the OHEJP the project description applies: M49-M60 (Y5)									
Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	**17**	18	19	20	21	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	IP	APHA	PHE
PM					**3,00**					
Participant	23	24	25	26	27	28	29	**30**	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	**RIVM**	WbvR	FHI
PM								**2,25**		
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives
T2.1: Start developing the strategic research and innovation agenda (SRIA)
T2.2: Update de EU-projects/initiatives and strategic interactions with EU-projects

Description of programmed activities:
Task 2.1: Development of the SRA
Task Leader: RIVM
Deputy Task Leader: UCM
Participants: all partner organisations

The final deliverables of WP2 will be delivered by the end of Y4. In Y5 WP2 will continue to monitor relevant scientific developments and provide input for the development of the strategic research and innovation agenda (SRIA) in WP7.

Task 2.2: Strategic interactions with EU projects and initiatives
Task Leader: UCM
Deputy Task Leader: RIVM
Participants: Anses, Sciensano, BfR, SVA
The repository database of relevant EU research projects and related initiatives will be updated during 2022 to be distributed among the OHEJP partners. Moreover, this information will be used by WP4 for the organization of cogwheel workshops.

Deliverables		
Ref	**Title**	**Due month**
N/A		
Milestones		
Ref	**Title**	**Due month**
N/A		

2.4.1.1.3 WP3-Management of Joint Research Projects

Set of Activity	**WP3-Joint Research Projects management**					**Lead Beneficiary**				**P04-Sciensano**
						Deputy Lead Beneficiary				**P31-WR**
Start month: M1						**End month: M60**				
Annual period of the OHEJP the project description applies: M49-M60 (Y5)										
Participant	1	2	**4**	6	7	8	9	10	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM			**17,00**							
Participant	**13**	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM	**3,00**									
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

Task 3.1: Drawing up of guidelines for submission, selection and evaluation of JRP proposals as well as request of extension of accepted JRPs.
Task 3.2: Supervision of the JRP in the first round of projects
Task 3.3: Organisation of a second round of projects and their supervision.
Task 3.4: Organisation of annual scientific meetings (ASM) where results from JRP are presented

Description of programmed activities:

Task 3.2: Supervision of the JRP in the first round of projects

Subtask 3.2.2 Follow-up of recently started projects

This task has been accomplished and has no activity in Y5

Subtask 3.2.3: Mid- and end-term evaluations; monitoring of the KPI, deliverables and milestones detailed in the annual JRP reports

Joint Research Projects will be monitored through the 9M and final reports, as in former years.

Subtask 3.2.4: End-term evaluations by external experts: final report

At the end of Y5, the last 13 JRP will come to an end and the final reports that Projects Leaders will prepare, will be presented to external evaluators for an overall assessment.

Task 3.3: Organisation of a second round of projects and their supervision. Task with help from WP4.

This task has come to an end.

Task 3.4: Organisation of annual scientific meetings (ASM) where results from JRP are presented

Subtask 3.4.1: Protocol for organisation of annual scientific meetings

This task has come to an end.

Subtask 3.4.2: Organisation of ASM, scientific part

The 2022 ASM will take place in Orvieto, Italy and will be co-organised by WP3.

Deliverables

Ref	Title	Due month
D3.18	4th periodic report on JRP	M51
D3.19	Abstract book for 4th Annual Scientific Meeting (ASM)	M54
D3.20	Report on evaluation of finalised JRPs, 2nd call	M60
D3.21	5th periodic report on JRPs	M60

Milestones

Ref	Title	Due month
MS43	Preparation of final evaluation reports	M57
MS44	Fourth Annual Scientific Meeting	M53
MS45	Final report preparation	M53
MS46	Final reports n°3	M57

2.4.1.1.4 WP4–Management of Joint Integrative Projects

Set of Activity		**WP4–Joint Integrative Projects**				**Lead Beneficiary**				**P41-SVA**
						Deputy Lead Beneficiary				**P36-INSA**
Start month: M1						**End month: M60**				
Annual period of the OHEJP the project description applies: M49-M60 (Y5)										
Participant	1	2	**4**	6	7	8	9	10	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM			**1,50**							
Participant	**13**	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	**33**	34	35	**36**	37	39	40	**41**	42	43
	NVI	PIWET	INIAV	**INSA**	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**1,31**			**2,00**				**12,00**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

T4.1: To develop guidelines for evaluation of final reports and keep already produced guidelines on JIP reporting up to date.
T4.2: To follow and support the launch and implementation of the JIPs from the 1st and 2nd call.
T4.3: To support the alignment of EJP activities with two external EU initiatives/projects, and to support internal integration through the arrangement of integrative missions and a thematic workshop.
T4.4: n/a

T4.5: To provide support and follow the implementation of the Data Management Plan (DMP), and ensure alignment with the overarching dissemination plan.

Description of programmed activities:

Task 4.1 Development of procedures and guidelines for submission and selection of JIP proposals, and for reporting and evaluation.

Subtask 4.1.1 Guidelines for submission and selection of JIP proposals
N/A
Subtask 4.1.2 Instructions for reporting on, and monitoring of JIP progress
N/A
Subtask 4.1.3 Guidelines for evaluation of JIPs
N/A
Task 4.2 Supervision of JIPs

Subtask 4.2.1 Start-up support
N/A
Subtask 4.2.2 Project monitoring

- Meetings between JIP Project Leaders (PLs) and the WP4 team will be arranged formally every three months and there will also be continuous support from WP4 available.
- The WP4 team will participate in JIP consortium meetings to inform about ongoing work and procedures and take part of progress and development.
- PLs will be informed about and updated regularly on activities which concern the JIPs.
- The WP4 will continue to follow-up on milestones and deliverables of ongoing JIPs.
- The 4th periodic report on the progress of the JIPs (D4.27, M51), will be produced.
- An amended AWP for WP4 Y6 will be provided, given that the OHEJP extension request is approved.

Subtask 4.2.3 Final evaluations

- JIP-3 CARE, JIP-4 OH-HARMONY-CAP and JIP-5 MATRIX will finish in Y5. External evaluators will be recruited. The recruitment process will build on the experience from and follow the same procedure as for the JIPs finished in Y4. Guidelines for evaluation D4.19 already exist.
- Report on evaluation of finalised JIPs, 1st round (D4.24), will be delivered.
- Information from JIP partners to determine the overall status of implementation of project outputs will be collected.
- Planning for a simulation exercise will continue, including the involvement of the Stakeholders. The exercise will build on the ECDC manual for simulation exercises "*Handbook on simulation exercises in EU public health settings - How to develop simulation exercises for supporting preparedness and response to communicable diseases*" and be performed at a national level. The exercise is scheduled for May-July Y5.
- Based on the evaluation of the simulation exercise there will be follow-up activities including the possible implementation of tools and guidelines produced in the JIPs.

Task 4.3 Integrative support

Subtask 4.3.1 Alignment with strategic initiatives at EU level
All planned Cogwheel workshops have been delivered.

Subtask 4.3.2 Support function for integration of additional partners in ongoing JIP.

- Promote the development of training opportunities to disseminate the outputs from JIPs and in this way advocate the use of developed guidelines and tools by potential end-users.

- Support the integration of JIP outputs with the MedVetNet Association website and other relevant websites for displaying JIP outputs.
- Together with the JIPs identify and execute additional integrative activities to further disseminate the outcomes.
- If possible, stimulate the dissemination of project outcomes by providing opportunities for STIMs and IMs.
- Provide WP5 with information about deliverables to be further disseminated to the stakeholders and to include the deliverables in the One Health Outcome Inventory.
- Continuous support to new partners and inform about activities, including the Simulation exercise.
- Encourage all OHEJP partners, including the new ones, to participate in the Simulation Exercise.

Subtask 4.3.3 Scientific meetings to enhance and leverage integration

- The report from the 4th thematic integrative meeting will be submitted (D4.26, M54).
- To contribute to the organisation of the annual ASM.

Task 4.4 Organisation of call for additional JIPs for the period Y3-Y5

N/A

Task 4.5 Open data management

Subtask 4.5.1 Development of the Data Management Plan

N/A

Subtask 4.5.2 Guidance and support for the implementation of the DMP

- Continuous supervision and support to project DMP leaders.
- The final DMPs of projects ending during Y5 will be evaluated by the DMP Committee.
- Final DMPs will be uploaded to Zenodo.
- The overarching Data Management Plan (DMP), D4.4, will be updated.

Subtask 4.5.3 Open data access point

- Feed the One Health Outcome Inventory with all deliverables from the JIPs, so that relevant ones can be uploaded. The inventory facilitates the access to open resources and is linked to the DMPs via a reader´s view to the CDP-tool. This is maintained by WP5.
- The projects will be further encouraged to follow the OHEJP Dissemination procedure, especially the licencing agreements.

Deliverables

Ref	Title	Due month
D4.24	Report on evaluation of finalised JIPs, 1st round	M54
D4.26	Report from thematic meeting IV	M54
D4.27	4th periodic report on JIPs	M51
D4.28	Report on evaluation of finalised JIPs, 2nd round	M60
D4.29	5th periodic report on JIPs	M60

Milestones

Ref	Title	Due month
MS63	External evaluators for JIPs second call	M60

2.4.1.1.5 WP5-Science to policy translation

Set of Activity	**WP5-Science to policy translation**				**Lead Beneficiary**		**P09-BfR**			
					Deputy Lead Beneficiary		**P13-SSI**			
Start month : M1					**End month : M60**					
Annual period of the OHEJP the project description applies: M49-M60 (Y5)										
Participant	1	2	4	6	7	8	**9**	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	**BfR**	FLI	RKI	DTU
PM							**14,00**			
Participant	**13**	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM	**11,20**									
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives:

- To broaden the interaction with stakeholders, covering national, EU and international interests
- To follow the established procedures for a good information flow and interaction between the OHEJP projects and national, EU and international stakeholders to support complementarity and synergy of activities and exploitation of results
- To regularly update research and integrative needs of stakeholders identified in policy processes and to keep the interaction with the OHEJP consortium
- To regularly integrate available science and activities and support alignment for closure of knowledge gaps of international stakeholders
- To support identification of potential for synergies between OHEJP activities and other international projects by supporting communication and disseminating actively results

- To foster dissemination of results from activities within the OHEJP following the targeted dissemination policy initiatives addressing the protection of consumers health

Description of programmed activities:

Task 5.1: Identification of the stakeholders and establishment of communication links

Subtask 5.1.1 Establish communication links with EU and international stakeholders

- The consolidation of communication links will be achieved by the Stakeholders Committee Meetings (SCM, subtask 5.4.2), which takes place twice during Y5, and by inviting stakeholders' representatives to join meetings of selected JIPs and JRPs, and other OHEJP events like the ASM, training activities, integrative workshops.
- WP5 will actively update Key EU stakeholders (ECDC and EFSA) and other EU and international stakeholders (EEA, EMA, FAO, OIE, WHO-Euro) regarding the scientific and integrative output of the consortium though Targeted Reports, ad hoc Thematic Reports (subtask 5.4.2) and specific workshops (subtask 5.3.2).
- Stakeholders will be involved and actively engaged in sustainability aspects of the OHEJP.

Subtask 5.1.2 Establish communication links to national stakeholders

- Interaction with national stakeholders will be consolidated by applying the OHEJP Outcome Inventory (subtask 5.3.1), the Data Management Plan Reader (subtask 5.4.1) and by communicating outcomes and achievements of the OHEJP as well as identified synergies and activities complementary to the OHEJP.
- Awareness on the outcomes of the OHEJP will be raised at national stakeholders' fora like the POC-PMC meeting and the SSB meeting.
- Dissemination workshops (subtask 5.3.2) will be targeted specifically at national stakeholders, and input for such workshops will be collected during POC-PMC and SSB meetings

Task 5.2: Identification of the research needs of EU stakeholders

Subtask 5.2.1 Platform for interaction

- WP5 will actively collaborate with the stakeholders to maintain the consolidated way in which the needs and support requests are identified and communicated, in order to keep the process timely and flexible.
- Dynamic and timely communication will be continued through the use of the virtual groups of the OHEJP website and, most importantly, by personal communications including appointed representatives.
- Main platform for interaction will be the two SCMs (subtask 5.4.2)
- Consolidation of research and integrative needs of the EU stakeholders will be continued to provide specific support and input for the Strategic Research and Innovation Agenda (SRIA).

Subtask 5.2.2 Systematic screening

- Regular and systematic screening of stakeholders' documents will be carried on in order to:
    - Identify synergies and potential overlaps with OHEJP research and address complemental activities.
    - Identify stakeholders' potential needs and knowledge gaps.
    - Keep the consortium up to date with upcoming EU regulations and strategies.
    - Identify emerging risks.
    - Identify opportunities to support EU and international stakeholders (e.g. consultations, expert advices, stakeholders' contributions).
- Website screened will be continuously updated to reflect changing stakeholders' interests.

- WP5 will keep publishing monthly documents summarising the outcomes of the activity "scanning of stakeholders' documents" and making them available to consortium members and stakeholders.

Subtask 5.2.3 Consolidation of results

- Scientific output of the OHEJP will be collected and mapped against the outcomes of the systematic screening. The result will be regularly discussed with the stakeholders (task 5.1 and task 5.4).
- Stakeholders' identified research and integrative needs will be used to update the Strategic Research Agenda (SRIA), a task led by WP7.

Action to close knowledge gaps will be discussed within the consortium and taken as appropriate.

Task 5.3: Linking of the scientific capacity available in the EJP with the stakeholders' identified needs: closure of knowledge gaps

Subtask 5.3.1 Capacity map

The One Health EJP Outcome Inventory (OHOI, formerly referred to as "capacity map") is an important tool for highlighting expertise, outcomes and updates of the OHEJP and of its activities, in particular JIPs, JRPs and PhDs. It allows broad dissemination of results of the various activities within the consortium and depicts to some extent complementarity with activities outside the OHEJP. Given its public nature, the OHOI targets not just the key EU stakeholders, but also national and international stakeholders, and any interested party (e.g. other One Health initiatives), and supports internal collaboration and dissemination. During the fifth year focus will be put on the following topics:

- Content of the OHOI will be regularly updated, as well as updated on a case base after request of projects' representatives.
- Content of the OHOI will be expanded to include outcomes of overarching activities
- Comments from the users will be taken into consideration to improve content and navigation.
- To ensure timely identification of potential overlaps and synergies of OHEJP activities with similar activities of stakeholders, WP5 will screen stakeholders' documents (subtask 5.2.2) and accordingly incorporate relevant information in the OHOI.
- WP5 will continue interacting with WP4 to avoid duplication of work between the OHOI and Data Management Plan (DMP, a task led by WP4).
- Appropriate linking between the OHOI and the DMP Reader (subtask 5.4.1) will be maintained
- WP5 will support sustainability of the OHOI after the end of the OHEJP by finding appropriate ways to keep the database publicly available.

Subtask 5.3.2:Scientific support to stakeholders

- WP5 will keep improving the strategy to achieve maximum exploitation of scientific results and integrative activities fulfilling the policy needs of various stakeholders. This will include the development of specific strategies addressing interests of national, EU and international stakeholders.
- Procedures to provide scientific support will be further developed and improved, and means will be discussed in the SCMs (subtask 5.4.2).
- Dissemination workshops will be organised in collaboration with WP3, WP4 and WP6. Dissemination workshops will:
    - Be centred on specific topics identified by the stakeholders at the national, EU, and international level for being of particular interest.
    - Highlight OHEJP developed solutions and how the presented solutions were used (or could potentially be used) in real life situations.

- Target preferably policy/decision makers at the national level, however as the solution presented have an impact at the EU and international level as well, EU and international organisations will be welcome to take part.

- Allocation of resources to support specific stakeholders' needs with specific actions (ad hoc support) will be continued and optimized.

Task 5.4: Dissemination of new knowledge, tools and materials

Subtask 5.4.1 Dissemination strategy

Given that the fifth year might mark the end of the OHEJP, WP5 will concentrate its efforts to disseminate scientific and integrative outputs in a targeted way, to meet the stakeholders' identified needs:

- The OHOI (subtask 5.3.1) will be updated and further developed to list scientific updates in a tidy and well-ordered way.
- Regular Targeted Reports (subtask 5.4.2) and ad hoc Thematic Reports (subtask 5.4.2) will be distributed to the stakeholders.
- The dissemination strategy will be discussed biannually in the SCM (subtask 5.4.2).
- Dissemination workshops (subtask 5.3.2) will be shaped considering stakeholders' needs, they will target policy/decision makers, and will depict practical solutions.

The DMP reader is a system set up during year 4 by WP4 and WP5 to provide early public access to DMP data. It allows any interested user to browse JIPs' and JRPs' metadata before the end of the projects. During the fifth year, it will be curated in collaboration with WP4 and with the company providing the software to allow public access to early DMP data.

Subtask 5.4.2 Targeted communication

- Regarding the Targeted Reports to Key EU Stakeholders:
    - They will be compiled and distributed twice per year, one month before each SCM.
    - Focus will be given on those topics of highest interests for ECDC and EFSA.
    - To give visibility also to projects not directly selected by ECDC and EFSA, brief summaries of all scientific publications produced by the OHEJP will be given.
    - Summaries of solutions produced by all finalised OHEJP projects will be added in each report.
    - The reports will facilitate linkage with external resources in case more insights are needed.
    - Although targeted mostly at ECDC and EFSA, they will be distributed also to the other stakeholders' organisations (EEA, EMA, FAO, OIE, WHO-Euro)
- Regarding the Thematic Reports:
    - They will be produced ad hoc, in response to specific stakeholders' needs.
    - They will cover specific topics and depict how the OHEJP is closing specific knowledge gaps.
    - The reports will facilitate linkage with external resources (primarily the OHEJP website) in case more insights are needed.
    - They will be publicly available on the OHEJP website and on Zenodo
- Tow Stakeholders Committee Meetings (SCM) will be organized:
    - To ease stakeholders' participation to other OHEJP events, one SCM will be organised in spring linked with the ASM, and another in autumn in conjunction with other main OHEJP events.
    - During the fifth year SCMs, focus will be put on disseminating OHEJP outcomes to support consideration of OHEJP results in stakeholders' policies.

- The SCM will be a forum to bring around the table all the stakeholders' organisations, and to involve them in sustainability aspects of the OHEJP (e.g. SRIA).
- Topics and points of discussion will be incorporated in the agenda as needs emerge.

Subtask 5.4.3 Stakeholder conference

- The stakeholders conference will be a standalone event targeted at policy/decision makers at the national, EU and international level.
- The format of the meeting will be discussed with the PMT of the OHEJP and with in order to allow proper participation.
- It will take place after the finalisation of OHEJP projects, so that solution presented could be readily applied.
- It will be organised either during the fifth year, of, in case of OHEJP extension, early in year 6

Deliverables		
Ref	**Title**	**Due month**
D5.10	Final annual report on dissemination activities to international stakeholders	M60
D5.11	Report on a stakeholder meeting	M60
Milestones		
Ref	**Title**	**Due month**
MS72	Identification of new knowledge gaps and research needs n°4	M60

2.4.1.1.6 WP6-Training and Education

Set of Activity		**WP6-Training and Education**					**Lead Beneficiary**			**P23-UoS**
							Deputy Lead Beneficiary			**P31-WbvR**
Start month : M1							**End month : M60**			
Annual period of the OHEJP the project description applies: M49-M60 (Y5)										
Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	**23**	24	25	26	27	28	29	30	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	**WbvR**	FHI
PM	**9,90**								**1,80**	
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

T6.1: Short Term Missions

T6.2: Workshop programme (satellite to Annual Scientific Meetings)

T6.3: One health' Summer School for medical and veterinary science undergraduates

T6.4: Doctoral Training Programme

T6.5: One-Health Continuing Professional Development (CPD) Module

T6.6: Communications workshop and media training

Description of programmed activities:

Task 6.1: Short Term Missions

WP6 will monitor the progress of the Short-Term Missions funded to take place in the fifth year, along with the missions that have been postponed from the third and fourth years of the OHEJP due to COVID-19. WP6 will work with the communications team to convey the main outcomes of the missions and testimonials from the awardees on the OHEJP website through visually attractive branded case studies. The deliverables D6.15 and D6.20 will both be submitted in M60 detailing the missions and their outputs. This will be uploaded on Zenodo and disseminated on our website and the OHEJP internal and external communication channels.

Task 6.2: Workshop programme (satellite to Annual Scientific Meetings)

WP6 will oversee and support the organisation of the final ASM satellite workshop. The WP6 team have a fully defined process where all selected local organisers are informed of the roles and responsibilities of the local organising team, ASM team, WP6 team and Communications Team to market and deliver the event successfully through a guidance document prepared by WP6 which is regularly evaluated and updated after each event. The deliverable D6.16 will be submitted in M60 which will report on the organisation, successes and evaluation of the event. This will be uploaded on Zenodo and disseminated on our website and the OHEJP internal and external communication channels.

Task 6.3: 'One health' Summer School for medical and veterinary science undergraduates

WP6 will oversee and support the organisation of the final Summer School. The WP6 team have a fully defined process where all selected local organisers are informed of the roles and responsibilities of the local organising team, WP6 team and Communications Team to market and deliver the event successfully through a guidance document prepared by WP6 which is regularly evaluated and updated after each event. The deliverable D6.17 will be submitted in M60 which will report on the organisation, successes and evaluation of the event. This will be uploaded on Zenodo and disseminated on our website and the OHEJP internal and external communication channels.

Task 6.4: Doctoral Training Programme

In the fifth and final year, WP6 will support the PhD projects with completion of their 9-month reports and final thesis reports which inform the Summary Progress Report Y5, and D6.18.

WP6 will continue to support and monitor the progress and dissemination activities of the PhD candidates and their projects through submission of their project deliverables and publications. WP6 will continue to work closely the communications team to support the PhD project outputs, outcomes, tools, reports, and publications are disseminated to the appropriate target audiences in a timely fashion, and in an engaging and suitable format for the target audience.

WP6 will ensure PhD candidates will participate at the Annual Scientific Meeting in a dedicated oral presentation session for OHEJP PhD projects and the Three Minute Thesis competition to showcase their projects and report on the results of their scientific research.

The WP6 and Communications team will work together to identify new and improved ways increasing engagement when disseminating PhD scientific research progress by fostering a diverse and more engaging strategy through the OHEJP's communication channels both to internal and external target audiences.

Task 6.5: One-Health Continuing Professional Development (CPD) Module

WP6 will oversee and support the organisation of the third and fourth CPD modules. This is because the call to organise the third CPD module was extended. The WP6 team have a fully defined process where all selected local organisers are informed of the roles and responsibilities of the local organising team, WP6 team and Communications Team to market and deliver the event successfully through a guidance document prepared by WP6 which is regularly evaluated and updated after each event. The deliverables D6.13 and D6.19 will be submitted in M60 which will report on the organisation, successes, and evaluation of the event. This will be uploaded on Zenodo and disseminated on our website and the OHEJP internal and external communication channels.

Task 6.6: Communications workshop and media training

Not Applicable as this training took place and was reported on in year 3. report.

Deliverables

Ref	Title	Due month
D6.14	Report n°3 of the annual short term missions completed also uploaded onto the EJP webpage.	M50
D6.15	Report on outputs of the short term missions	M60
D6.16	Report n°4 on one workshop per year associated with ASM (with WP1,3,4 and 5)	M60
D6.17	Report n°4 of the One health summer school with a minimum of 12 delegates	M60
D6.18	Thesis Reports of up to 16 PhD studentships	M60
D6.19	Report of the fourth CPD module in one health	M60
D6.20	Report n°4 of the annual short term missions completed also uploaded onto the EJP webpage.	M60
D6.22	4th Periodic Report on PhDs	M51

Milestones

Ref	Title	Due month
N/A		

2.4.1.1.7 WP7-Sustainability

Set of Activity		**WP7-Sustainability**						**Lead Beneficiary**		**P27-ISS**
								Deputy Lead Beneficiary		**P20-IP**
Start month: M37								**End month: M48**		
Annual period of the OHEJP the project description applies: M49-M60 (Y5)										
Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	**27**	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	IZSAM	IZSLER	RIVM	WbvR	FHI
PM					**2,00**					
Participant	33	34	35	36	37	39	40	**41**	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM								**14,00**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

T7.1: Gathering Stakeholders´ Needs and Expectations

To assess stakeholders need and expectations toward the long-term sustainability of OHEJP through the completion of the modules OH and AMR.

T7.2: Strategic Research and Innovation Agenda (SRIA) 2021-2030 (SRIA 2021-2030);

To finalize the SRIA for long-term sustainability of OHEJP

T7.3: Making the EJP sustainable through other funding and/or legal basis

T7.4: Making the bridges between EJP's beneficiaries and stakeholders sustainable

To assess boundaries and opportunities for the long-term sustainability of the OHEJP through the PhD project SUSTAIN

Description of programmed activities

Task 7.1: Gathering Stakeholders´ Needs and Expectations (Task leader BfR/participants: ANSES, ISS, SVA)

In close interaction with WP5 (science-to-policy transfer) and WP2 (as regards gap analysis and new, unmet research needs) WP7 develops two "modules" that involve scientists from OHEJP beneficiaries and scientists from outside (including SSB), representing inputs from the scientific world outside the OHEJP. Meanwhile, updates on WP7 will be duiscussed with Stakeholders committee, SSB and ESAB in order to gather critical inputs from the main external governance bodies.

The two modules are:

- AMR module in order to develop a SRIA on the OH aspects of AMR in close interactions with the core group of the new AMR partnership.
- the OH module to build a SRIA on OH-relevant activities on food safety and emerging threats, using the risk assessment paradigm, thus a cross-cutting module.

Task 7.2: Strategic Research and Innovation Agenda (SRIA) 2021-2030 (SRIA 2021-2030)
Task leader: ISS / Participants: RIVM, ANSES, BfR, SVA UCM.

A draft SRIA (DL 7.3) -outlining the main points and priority issues of the final SRIA will be circulated as internal deliverable to the PMT comments.

The final procuct of Task 7.2 is the "OHEJP Strategic Research and Innovation Agenda 2021-2030, a strategy document for the sustainability of OHEJP"
With the following detailed contents
The past: background and context, introduction of the OHEJP
The present: setting the scene based on today's situation and conditions
The future: how this SRIA will address the actual needs of stakeholders in the future
Vision and mission
Objectives
a) The six OHEJP specific objectives (SRA)
b) Additional objectives of the SRIA
Expected impacts
Priority research and integrative topics/themes or R&I priority areas
a) AMR: Introduction, rationale, challenges; R&I objectives;. Activities that will ensure sustainability in the future; Synergies and external (outside OHEJP) links with JPIAMR, and other relevant initiatives; Outcomes; Expected Impacts
b) One Health: Introduction, rationale, challenges; R&I objectives;. Activities that will ensure sustainability in the future; Synergies and external (outside OHEJP) links with JPIAMR, and other relevant initiatives; Outcomes; Expected Impacts
c) The environment and climate change, preparedness, emerging threats and others
d) Cross cutting issues and horizontal activities
Drivers and enablers
Implementation plan or Road map for the SRIA
Synergies and complementarities of the SRIA (in general, besides the specific ones under each topic area)
Dissemination
Next steps: what the SRIA can be used for

Task 7.3: Making the EJP sustainable through other funding and/or legal basis

This Task is currently incorporated into 7.1 and 7.2 WP7, in collaboration witjh WP2, will assess the new opoprtunities for OHEJP sustainability provided by Horizon Europe and Partnerships, as well as the drivers that modulate the demands of stakeholders.

Task 7.4: Making the bridges between EJP's beneficiaries and stakeholders sustainable

Task Leader: SVA / Participants: all beneficiaries

The PhD project SUSTAIN will finalize its assment of opportunities and boundaries for OH institutionalization. A second round of interviewd in Italy, with a stage at ISS, will take place at fell-winter of 2021, as soon as the restictions due to Covid will be relaxed. The project will be finalized on Mo 50.

Deliverables

Ref	Title	Due month
D7.4	Document on institutionalisation of One Health	M50
D7.5	Final One Health SRIA 2021 - 2030	M60

Milestones

Ref	Title	Due month
MS100	Institutionalisation analysis	M50
MS101	Workshop on road map for institutionalisation of One Health	M54
MS104	Selection of the most appropriate legal statutes	M58

2.4.1.1.8 JRP12-R2-AMRSH5-FARMED

Reference to the Strategic Research Agenda (please refer to D2.7)	**AMR-SH 5: Development of new tools for early (real-time) detection of resistant pathogens in humans and animals, as well as new diagnostic tools, in particular on-site tests for humans and animals**									
Research Project Title	**Fast Antimicrobial Resistance and Mobile-Element Detection using metagenomics for animal and human on-site tests**									
Research Project Acronym	**FARMED**									
Leading Organisation	**P21-APHA**				Deputy Leading Organisation				**P31-WbvR**	
Project Leader	**Manal AbuOun**				Deputy Project leader				**Michael Brouwer**	
Project Start month	**M25**				Project End month				**M54**	
Participant	1	2	**4**	6	7	8	**9**	10	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	VRI	**BfR**	FLI	RKI	DTU
PM			**9,35**				**3,50**			5,00
Participant	**13**	14	15	16	**17**	18	19	20	**21**	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	IP	**APHA**	PHE
PM	**4,50**				**12,00**				**6,13**	
Participant	23	24	25	26	**27**	**28**	29	30	**31**	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	**IZSAM**	IZSLER	RIVM	**WbvR**	FHI
PM					**2,75**	**6,50**			**3,61**	
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Work Package 1: Assess feasibility of Long-read metagenome sequencing on exemplar matrices. Investigate the use of Hi-C metagenomics.
- Work Package 2: Bioinformatics tools to analyse long-read metagenome samples
- Work Package 3: Implementation of on-site protocols for long-read metagenomic DNA sequencing
- Work Package 4: Project management, coordination and training workshop

Description of work

JRP12-WP1 - Assess feasibility of Long-read metagenome sequencing on exemplar matrices. Investigate the use of Hi-C metagenomics

JRP12-WP1 takes place over the first, second and third year of the project.

WP start / end month: M25 – M52
WP Leader: Sigrid De Keersmaecker (4, Sciensano, BE)
Deputy WP Leader: Josephine Grützke (9, BfR, GE)
WP participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the WP:
WP1 will test and compare long-read sequencing to short-read sequencing to characterise the metagenome (including bacterial species) within 'simple' and 'complex' matrices. The aim will be to implement these methods for use with medical or veterinary practice. The ONT MinION, is a portable real-time device (100 grams), generating, in real-time, up to 30Gb of DNA sequencing. The longer lengths (>100kb) of DNA sequence data enable the user to find associations with bacteria, the plasmid and AMR genes, in real-time, without the need to traditional whole genome sequencing. Long-read sequencing technology has not been used broadly for metagenomics, so it will be compared to the current gold standard (short-read sequencing). A limited number of samples will also be compared to PacBio sequencing. Current laboratory based DNA extraction protocols will be used to establish if long-read sequencing is suitable for metagenome analysis.
A new sequencing technology, Hi-C that fuses DNA that is in close structural proximity during the DNA isolation and DNA-library preparation, will be investigated. This method uses short-read sequencing technology but during the analysis, this method will reveal information about the genetic context in which AMR genes are present. Together with long-read sequencing data, this information will be used to determine which bacterial species (pathogen and commensal) the AMR gene is present and whether it is harboured on the chromosome or a plasmid.

JRP12-WP1-T2 - Assess feasibility /perform long-read metagenomics MinION from 'simple' sample matrices.
JRP12-WP1-T2 will take place over first, second and third year of the project.
Task start / end month: M27-M50
Task Leader: Sigrid De Keersmaecker (4, Sciensano, BE)
Deputy Task Leader: Soren Persson (27, SSI, DK)
Task Participants: Sciensano (4), DTU (12), SSI (13), UCM (17), APHA (21), IZSAM (28)
Description of the task: We will use current standard DNA isolation techniques, on a selection of 'simple' sample matrices (i.e. a limited number of bacteria expected, such as drinking water, urine, blood), to will evaluate the capability and practical feasibility of long-read sequencing to analyse the microbiome, and compare this to short-read sequencing. 'Simple' sample matrices present challenges such a potentially low concentration of the bacterial community, which could affect ability of sequencing to resolve the community, to a level that is diagnostically beneficial to detect bacterial

species and AMR determinant for the clinician or veterinarian. Different spiking concentrations of bacteria will be tested to determine limits of detection, and evaluate the accuracy of bacterial species and its association with genetic characteristics (such as AMR and mobile genetic elements) prediction. We will compare the sensitivity and specificity for species and subspecies identification, as well as the acquisition of information regarding the genetic context of AMR genes.

JRP12-WP1-T3 - Assess feasibility/perform long-read metagenomics MinION from 'complex' sample matrices.

JRP12-WP1-T3 will take place over first, second and third year of the project.
Task start / end month: M29-M52
Task Leader: Josephine Grützke (9, BfR, GE)
Deputy Task Leader[i]: Sigrid De Keersmaecker (4, Sciensano, BE)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), IZSAM (28), WBVR (31)
Description of the task: For a selection of 'complex' sample matrices (i.e. either multiple bacteria present, or difficult DNA extraction, such as faeces (human and animal), environmental (e.g. dust, wastewater, boot swabs) and food/feed samples), we will evaluate the capability and practical feasibility of long-read sequencing to analyse the microbiome, and compare this to short-read sequencing. 'Complex' sample matrices present several challenges such as the large microbial load as well as the presence of contaminants, which could inhibit DNA sequencing and the presence of non-bacterial DNA. We will compare the sensitivity and specificity for species and subspecies identification, as well as the acquisition of information regarding the genetic context of AMR genes. Amongst others, already microbiologically well-characterized poultry faecal samples collected from in vivo animal experiments, carried out during the EFFORT project for which short-read sequencing data which is already available, will be analysed. This task will be completed in second year of project.

JRP12-WP1-T4 - Perform Hi-C metagenomics.

JRP12-WP1-T4 will take place over first, second and third year of the project.
Task start / end month: M33-M51
Task Leader: Josephine Grützke (9, BfR, GE)
Deputy Task Leader: Sigrid De Keersmaecker (4, Sciensano, BE)
Task Participants: Sciensano (4), BfR (9), UCM (17), WBVR (31)
Description of the task: A 'defined' bacterial community, containing various bacterial species (with known complete sequences) and harbouring different AMR plasmids will be prepared and analysed using Hi-C library preparation and short-read sequencing. This analysis will reveal the feasibility, specificity, and sensitivity of Hi-C. Available bioinformatics tools will be used to analyse the sequencing data, although these tools may require adaptation, which will take place in WP2. In the next step, spiked samples (T1.1) and samples from the EFFORT project (T1.3) will be analysed by this approach and compared to long-read and conventional short-read metagenomic sequencing. Additionally, where possible, approaches for a combined analysis of Hi-C and long-read data will be explored to improve the analysis.

WP2 - Bioinformatics tools to analyse the sequencing data and defining the characteristics within the sample.

JRP12-WP2 will take place over first, second and third year of the project.

WP start / end month: M28 – M60
WP Leader: Frank Aarestrup (12, DTU, DK)
Deputy WP Leader: Bruno Gonzalez-Zorn (17, UCM, Spain)

WP participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the WP:
WP2 will implement a ready-to-use package KMA to assess, analyse, and perform reference-based taxonomic assignment of metagenomics DNA sequence data. The package can also carry out a post-processing analysis to produce reliable taxonomic annotation at species and strain resolution of both metagenomics and single isolate samples. KMA employs a novel mapping method *k*-mer alignment, which outperforms any currently available method in both accuracy and speed, without increased computational demands. The package and the mapping method are already in use in our routine daily analyses at DTU and will be available to analyse the data generated in WP1. These bioinformatics tools will markedly improve both taxon detection, and AMR and mobile element characterisations and dynamics in metagenomics samples. The current high performance computing (HPC) based tools will be established as a laptop version for further validation and testing. During the third year, the optimised long-read analysis tools will be made both publicly available and accessible for testing for all the participants.

JRP12-WP2-T1 - Development/adaptation of a pipeline that can predict species within sample/matrix

JRP12-WP2-T1 will take place over first, second and third year of the project.

Task start / end month: M28-M51
Task Leader: Frank Aarestrup (12, DTU, DK)
Deputy Task Leader: Josephine Grützke, (9, BfR, GE)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21)
Description of the task: The KMA pipeline will be tested and evaluated, and improved based on data submitted from the project participants. The performance of the KMA to produce reliable taxonomic annotation will be assessed using long-read sequencing data from defined mock communities, spiked samples, and 'real' samples, established in WP1 and WP3. Bioinformatics tools for analysis of Hi-C/short-read sequencing will also require testing and optimisation to allow integration with KMA.

JRP12-WP2-T2 - Development/adaptation of a Resfinder-'like' pipeline for identification of AMR for long-read sequences

JRP12-WP2-T2 will take place over year the first, second and third year of the project.

Task start / end month: M30-M55
Task Leader: Frank Aarestrup (12, DTU, DK)
Deputy Task Leader: Bruno Gonzalez-Zorn (17, UCM, Spain)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27)
Description of the task: The KMA tool will be further developed and tested for use with long-read sequencing to map and identify AMR, virulence and plasmid genes as well as their genetic origin with a metagenomics sample. Bioinformatics tools for analysis of Hi-C/short-read sequencing will also require testing and optimisation to allow integration with KMA.

JRP12-WP2-T3 - Benchmarking of tools with spiked samples in WP1 and WP3

JRP12-WP2-T3 will take place over second and third year of the project.

Task start / end month: M40-M57
Task Leader: Soren Persson (27, SSI, DK)
Deputy Task Leader: Frank Aarestrup (12, DTU, DK)
Task Participants: BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)

Description of the task: The tools developed in WP2 (e.g. KMA), used for the detection of known genes/species from the metagenomics sequencing, will be shared with the partners for evaluation against other established tools such as kraken, centrifuge and Resfinder.

JRP12-WP2-T4 - Test protocols on-site

JRP12-WP2-T4 will take place over second and third year of the project.

Task start / end month: M42-M60
Task Leader: Manal AbuOun (21, APHA, UK)
Deputy Task Leader: Soren Persson (27, SSI, DK)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the task: The bioinformatics tools developed on high performance computers (in T2.1 and T2.2) will be implemented on portable laptop computers. The performance of the bioinformatics tools on these laptops will be tested and further validated, on-site, outside of the laboratory setting, with limited access to Wi-Fi or mobile data connectivity.

WP3 - Implementation of on-site protocols for long-read metagenomic DNA sequencing

JRP12-WP3 will take place over first, second and third year of the project.

WP start / end month: M25 – M60
WP Leader: Mike Brouwer (31, WBVR, NL)
Deputy WP Leader: Soren Persson (27, SSI, DK)
WP participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), IZSAM (28), WBVR (31)
Description of the WP:
WP3 will focus on the necessary protocols and technologies to prepare samples in an on-site setting such as on a farm or in a hospital ward. To allow for on-site DNA sequencing and analysis, all steps will need to be carefully considered, including the DNA isolation from various sample matrices (WP1), sequencing library preparation, and downstream analysis. DNA isolations for on-site molecular applications have previously been described but the DNA quality and yield are likely to be low in many protocols as other molecular methods often rely on amplification of nucleic acids, for which low amounts of starting material is needed. For the on-site preparation of the sequencing libraries, two strategies will be investigated. Three instruments capable of on-site DNA extraction and library preparation will be assessed. The second strategy will include investigation of the feasibility of the standard DNA extraction protocols used in WP1 to be adopted for on-site usage.

JRP12-WP3-T2 - Investigation of on-site equipment for DNA extraction and sequencing

JRP12-WP3-T2 will take place over first, second and third year of the project.

Task start / end month: M30-M53
Task Leader: Manal AbuOun (21, APHA, UK)
Deputy Task Leader: Mike Brouwer (31, WBVR, NL)
Task Participants: Sciensano (4), DTU (12), SSI (13), UCM (17), APHA (21), WBVR (31)
Description of the task: Two commercially available mobile DNA extraction instruments will be assessed for their suitability to produce sequence quality DNA from a range of matrices on-site. The ONT VolTRAX V2 will be examined for its capacity preparing sequence library preparations on-site. The VolTRAX is a small, portable, and automated DNA library preparation device, which uses magnetic beads for DNA library preparation using magnetic beads, checks DNA quality, and has multiple reagent ports, which can be directly loaded onto the MinION for sequencing.

JRP12-WP3-T3 - Assess DNA isolation methods for suitability, test on matrices (faeces, blood, dust, (environmental), milk).

JRP12-WP3-T3 will take place over first, second and third year of the project.

Task start / end month: M33-M60
Task Leader: Giuliano Garofolo (28, IZSAM, Italy)
Deputy Task Leader: Sigrid De Keersmaecker (4, Sciensano, BE)
Task Participants: Sciensano (4), DTU (12), SSI (13), UCM (17), APHA (21), IZSAM (28), WBVR (31)
Description of the task: DNA isolation methods that have been determined most suitable for on-site application in the literature study of Task WP3-T1, will be assessed for 'simple' and 'complex' matrices as described in WP1. These experiments will be evaluated whilst replicating on-site conditions, within the laboratory, to determine which methods are most suitable for downstream NGS library preparation. Numerous parameters will be taken under consideration such as DNA yield, absence of contaminants and host DNA, limitations on us of specialised equipment, ease of use by trained but non-expert personnel, and cost.

JRP12-WP3-T4 - Test protocols on-site

JRP12-WP3-T4 will take place over second and third year of the project.

Task start / end month: M37-M60
Task Leader: Manal AbuOun (21, APHA, UK)
Deputy Task Leader: Bruno Gonzalez-Zorn (17, UCM, Spain)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), IZSAM (28), WBVR (31)
Description of the task: The DNA isolation and library preparation protocols will be performed outside of the laboratory environment, with limited use of specialised equipment. These tests in real-world settings are essential to determine if the protocols perform as expected and will eliminate any overseen obstacles. On-site test sites may include farms, veterinary practices, hospitals, GP practices, university teaching sites (outside of the laboratory) and other locations that will be determined.

WP4 - Project management, coordination and training workshop

JRP12-WP4 will take place over first, second and third year of the project.

WP start / end month: M25 – M60
WP Leader: Manal AbuOun (21, APHA, UK)
Deputy WP Leader: Mike Brouwer (31, WBVR, NL)
WP participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the WP:
This work package will manage and steer the project, all institutes will contribute, to ensure successful and timely delivery. Three videoconference meetings and one annual physical meetings, between all institutes will assess progress of the project. The annual meetings will take place at three different participating institutes. Any issues or concerns raised by any participating institutes will be communicated to the project lead and deputy lead, to allow rapid resolution. WP leaders, deputy leaders and task leaders, to ensure awareness and transparency, will approve all documents and communications, about the FARMED project.

JRP12-WP4-T1 - Annual physical project meetings
JRP12-WP4-T1 will take place over first, second and third year of the project.

Task start / end month: M30-M60
Task Leader: Mike Brouwer (31, WBVR, NL)

Deputy Task Leader: Manal AbuOun (21, APHA, UK)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the task: Three 'physical' annual meetings will take place to enable an open exchange of ideas and project outcomes between FARMED partners. The meetings will be organised in different countries and will include representatives from all partners. The date of physical meeting will be reviewed as the COVID-19 situation changes in Europe to allow seamless travel between countries. In the final meeting, a two workshop will enable the dissemination of the sequencing and bioinformatics analysis protocols developed during the project (JRP12-WP4-T3).

JRP12-WP4-T2 - Teleconferences will be organised every 3 months, between partners
JRP12-WP4-T2 will take place over first, second and third year of the project.

Task start / end month: M25-M60
Task Leader: Indre Navickaite (21, APHA, UK)
Deputy Task Leader: Bruno Gonzalez-Zorn (17, UCM, Spain)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the task: All project partners/management committee will meet or communicate every quarter, to assess progress of the project by each partner. This will also allow partners to discuss and address possible problems, risks, technical issues, project communication, and publications. Partners will be encouraged to continue email communication, contacting the management committee at the earliest opportunity, as and when required, especially if any issues arise.

JRP12-WP4-T3 - Training/dissemination of developed protocols
JRP12-WP4-T3 will take place over second and third year of the project

Task start / end month: M48-M60
Task Leader: Frank Aarestrup (12, DTU, DK)
Deputy Task Leader: Soren Persson (27, SSI, DK)
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the task: Towards the end of the project period we will collect and condense the developed protocols for on-site DNA purification and library prep into a standardised protocol for practical metagenome sequencing at decentral locations across Europe. This work will be divided in two parts: 1) a simple protocol for robust on-site DNA extractions (SSI); 2) a data-analysis pipeline for either local or cloud-based screening of DNA sequences that immediately returns species identifications and antibiotic-resistance profiles to the local sites (DTU). This harmonisation will form the topic for a two-day workshop in Denmark, Copenhagen/Lyngby, with the first day focussing on on-site DNA extractions and the second day focussing on bioinformatics analyses and returning answers immediately to on-site users.

JRP12-WP4-T4 - Annual reports

JRP12-WP4-T4 will take place in the final 2 months of first, second and third year of the project.

Task start / end month: M36-M60
Task Leader: APHA
Deputy Task Leader: WBVR
Task Participants: Sciensano (4), BfR (9), DTU (12), SSI (13), UCM (17), APHA (21), ISS (27), IZSAM (28), WBVR (31)
Description of the task: An annual report will be complied by project partners to provide updates on progress of work packages and tasks. These communications will be distributed to relevant

organisations or stakeholders such as national governments, EU, international agencies, and relevant industry/health partners. On-site DNA extraction and sequencing protocols, as well as bioinformatics pipeline/tools generated from this project will be published in appropriate scientific journals and coding repositories.

Deliverables

Ref	Title	Due month
D-JRP12-WP1.2	Report on the feasibility of using Hi-C sequencing for metagenomics to define the context of AMR genes.	M51
D-JRP12-WP1.1	Report on an initial assessment of long-read sequencing for metagenome (community and AMR) analysis (defined community, spiked and real simple and complex matrices) and comparison to current short-read standard.	M52
D-JRP12-WP2.1	Optimised long-read sequence bioinformatics tool for the analysis of microbial communities made publicly available.	M58
D-JRP12-WP2.2	Optimised long-read sequence bioinformatics tool for analysis of the resistome made publicly available.	M53
D-JRP12-WP3.3	Protocol for on-site extraction of high-quality DNA from clinical, veterinary, and environmental samples, suitable for long-read metagenome sequencing.	M60
D-JRP12-WP3.4	Detailed method for on-site long-read sequencing of sample matrix.	M60
D-JRP12-WP3.5	Report on initial findings of on-site diagnostic tests and IT solutions for human clinical, veterinary and environmental samples for early warning of emerging resistant pathogens.	M60
D-JRP12-WP4.1	Annual communication to external stakeholders and OH EJP coordinators	M60

Milestones

Ref	Title	Due month
M-JRP12-02	Assessment of long-read sequencing for resolving a 'defined' microbial community and their AMR genes, using current DNA extraction methods; and comparison to current short-read sequencing standard.	M48
M-JRP12-03	Assessment of long-read sequencing on spiked metagenome samples, using current DNA extraction methods, and comparison to current short-read sequencing standard for resolving the microbial community and AMR content/context.	M48
M-JRP16-04	Protocols for on-site high quality DNA extraction using Voltrax and library preparation ready for testing on-site	M50
M-JRP12-05	Assessment of long-read sequencing for 'simple' metagenome samples, using current DNA extraction methods, and comparison to current short-read sequencing standard for resolving the microbial community and AMR content/context.	M50
M-JRP12-06	Assessment of the feasibility of Hi-C sequencing for metagenomics to define the context of AMR genes.	M51

M-JRP16-07	Protocols for extraction of high-quality DNA (using different methods than Voltrax) from clinical, veterinary and environmental samples (simple and complex), suitable for long-read metagenome sequencing distributed amongst FARMED consortium for testing.	M51
M-JRP12-08	Assessment of long-read sequencing for 'complex' metagenome samples, using current DNA extraction methods, and comparison to current short-read sequencing standard for resolving the microbial community and AMR content/context.	M52
M-JRP16-09	Development/adaptation of a pipeline that can predict species within sample/matrix	M51
M-JRP16-10	Finalised protocol for on-site long-read sequencing of sample matrix distributed amongst FARMED consortium for testing.	M53
M-JRP12-11	Development/adaptation of a Resfinder-'like' pipeline for the identification of AMR from long-read sequences	M55
M-JRP12-12	Hands-on laboratory and bioinformatics workshop organised at DTU and SSI	M59
M-JRP12-13	Benchmarking of bioinformatics tools developed in WP2 with metagenomic sequences gained from T1.1, T1.2 and T1.3	M57
M-JRP12-14	Test the bioinformatics tools that were benchmarked and developed in WP2 on a laptop that is on-site (outside of laboratory conditions)	M60
M-JRP12-15	DNA extraction, library preparation and long-read sequencing tested on-site (outside of laboratory conditions)	M58
M-JRP12-16	Voltrax DNA extraction, Voltrax library preparation and long-read sequencing tested on-site (outside of laboratory conditions)	M58
M-JRP12-17	Complete workflow of DNA extraction (with or without Voltrax), library preparation (with or without Voltrax), long-read sequencing, and bioinformatic analysis tested on-site for early warning of emerging resistant pathogens.	M60

2.4.1.1.9 JRP13-R2-AMRSH5-WORLDCOM

Reference to the Strategic Research Agenda (please refer to D2.7)	**AMR 2.1**									
Integrative Project Title	**Development of new tools for real-time detection of zoonotic bacteria and antimicrobial resistance in veterinary, human and environmental sources**									
Integrative Project Acronym	**WorldCom**									
Leading Organisation	**P25-NUIG**				Deputy Leading Organisation			**P-23 UoS**		
Project Leader	**Prof. Terry Smith**				Deputy Project leader			**Dr. Arnoud van Vliet**		
Project Start month	**M25**				Project End month			**M60**		
Annual period of the OHEJP the work plan applies: Y5										
Participant	1	2	4	6	7	8	9	**10**	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	**FLI**	RKI	DTU
PM								**7,60**		
Participant	13	**14**	15	16	**17**	18	19	20	21	22
	SSI	**UT**	VFL	INIA	**UCM**	MVNA	INRA	IP	APHA	PHE
PM		**8,00**			**10,00**					
Participant	**23**	24	**25**	26	27	28	29	30	31	32
	UoS	OKI	**NUIG**	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM	**6,40**		**4,35**							
Participant	**33**	34	35	**36**	37	39	40	41	42	43
	NVI	PIWET	INIAV	**INSA**	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM				**8,00**						
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives:

- Feasibility testing of laboratory and on-site tests
- Generation of information for dissemination

WP: 4 Evaluation of on-site tests and other tools developed

WP start month: 45 + 6 = new start month 51

WP end month: 52 + 6 = new end month 60

WP Leader: Friedrich-Loeffler-Institut

Deputy WP Leader: Instituto Nacional de Saúde Doutor Ricardo Jorge

WP participants: Friedrich-Loeffler-Institut, Instituto Nacional de Saúde Doutor Ricardo Jorge, VISAVET Health Surveillance Centre UCM, University of Tartu, University of Surrey, NUI Galway.

Description of the WP: Evaluation of on-site tests and other tools developed.

This work-package will be carried out over two annual periods from month 51-60 of third annual period.

Task 1 (JPR13-AMR2.1-WP4-T1): Feasibility testing of laboratory and on-site tests for detection of pathogens and resistance genes

Task start month: new start month 51

Task end month: 52 + 6 = new end month 58

Task Leader: Friedrich-Loeffler-Institut

Deputy Task Leader: Instituto Nacional de Saúde Doutor Ricardo Jorge

Task Participants: Friedrich-Loeffler-Institut, Instituto Nacional de Saúde Doutor Ricardo Jorge, VISAVET Health Surveillance Centre UCM, University of Tartu, University of Surrey, NUI Galway.

Description of the task: Laboratory-based and on-site tests will be feasibility tested and evaluated by veterinary, medical and environmental partners on the project team using animal, environmental, food and human clinical samples. Comparison of results from partner testing sites will be carried out. Additionally, organisms of interest will be isolated from the various sample types and phenotypically characterised. Isolates of interest will subsequently be and sequenced and the output will be tested using the algorithms developed as part of WP1 to predict anti-microbial resistance.

Task 2 (JPR13-AMR2.1-WP4-T2): Generation of information for dissemination

Task start month: 49 + 6 = new start month 55

Task end month: 54 + 6 = new end month 60

Task Leader: Friedrich-Loeffler-Institut

Deputy Task Leader: Instituto Nacional de Saúde Doutor Ricardo Jorge.

Task Participants: Friedrich-Loeffler-Institut, Instituto Nacional de Saúde Doutor Ricardo Jorge, VISAVET Health Surveillance Centre UCM, University of Tartu, University of Surrey, NUI Galway.

Description of the task: Following evaluation of the tests and other tools developed as part of the project, protocols and SOPs will be prepared to allow for dissemination of the outputs generated as part of this project, across the OneHealth EJP partners for further evaluation.

Deliverables

Ref	Title	Due month
D- **JPR13**-AMR2.1-WP4.1	Feasibility testing of on-site tests for pathogens and antimicrobial resistance genes complete	58
D- **JPR13**-AMR2.1-WP4.2	Novel algorithms for prediction of antimicrobial resistance	60
D- **JPR13**-AMR2.1-WP4.3	Protocols and SOPs prepared and available for dissemination	60

Milestones

Ref	Title	Due month
M-JPR AMR2.1-13	Feasibility testing of laboratory and on-site tested underway	51
M-JPR AMR2.1-14	Feasibility testing of novel algorithms underway	55

WP: 5 Project Management

WP start month: 25

WP end month: 54 +6 = 60

WP Leader: NUI Galway

Deputy WP Leader: University of Surrey

WP participants: Friedrich-Loeffler-Institut, Instituto Nacional de Saúde Doutor Ricardo Jorge, VISAVET Health Surveillance Centre UCM, University of Tartu, University of Surrey, NUI Galway.

Description of the WP: Overall WorldCom project management.

Task start month: 25

Task end month: 60

Task Leader: NUI Galway

Deputy Task Leader: University of Surrey

Task Participants: NUI Galway, University of Surrey, Friedrich-Loeffler-Institut, Instituto Nacional de Saúde Doutor Ricardo Jorge, VISAVET Health Surveillance Centre UCM, University of Tartu.

Description of the task: A close out meeting will be organised in the third annual period. Technical and financial reports will be prepared for submission. All information and material for dissemination to stakeholders will be prepared in line with the data management plan.

Deliverables

Ref	Title	Due month
D- **JPR13**-AMR2.1-WP5.1	Close out meeting organised	60
D- **JPR13**-AMR2.1-WP5.2	Final technical and financial reports prepared	60
D- **JPR13**-AMR2.1-WP5.3	Communication and dissemination of project output to OHEJP consortium and stakeholders	60

Milestones		
Ref	**Title**	**Due month**
M- **JPR13**-AMR2.1-15	Generation of technical and financial reports	60
M- **JPR13**-AMR2.1-16	Dissemination of outputs from the project to the One Health scientific community and publicly	60

2.4.1.1.10 JRP14-R2-AMR2.1-FULL-FORCE

Reference to the Strategic Research Agenda (please refer to D2.7)	**AMR 2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer in humans, animals and the environment, including epidemiology of resistant microorganisms and antimicrobials in the environment and their (environment-mediated) spread**		
Research Project Title	**Full-length sequencing for an enhanced EFFORT to map and understand drivers and reservoirs of antimicrobial resistance**		
Research Project Acronym	**FULL_FORCE**		
Leading Organisation	**P4-Sciensano**	Deputy Leading Organisation	**P31-WbvR**
Project Leader	**Pieter-Jan Ceyssens**	Deputy Project leader	**Michael Brouwer**
Project Start month	**M25**	Project End month	**M60**
Annual period of the OHEJP the work plan applies: Y5			

Participant	**1**	2	**4**	6	7	8	**9**	10	11	**12**
	Anses	Ages	**Sciensano**	NDRVMI	SZU	VRI	**BfR**	FLI	RKI	**DTU**
PM	**4,00**		**6,12**				**1,75**			**3,85**
Participant	**13**	14	15	**16**	**17**	18	**19**	20	**21**	22
	SSI	UT	VFL	**INIA**	**UCM**	MVNA	**INRA**	IP	**APHA**	PHE
PM	**14,29**			**0,00**			**2,15**		**3,05**	
Participant	23	24	25	26	**27**	**28**	29	**30**	**31**	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	**IZSAM**	IZSLER	**RIVM**	**WbvR**	FHI
PM					**3,75**			**3,69**	**7,06**	
Participant	**33**	**34**	35	**36**	37	39	**40**	**41**	42	43
	NVI	**PIWET**	INIAV	**INSA**	IISPV	SLV	**FOHM**	**SVA**	NMVRVI	ISCIII
PM	**0,92**	**3,10**		**5,85**			**0,90**	**3,90**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

In the final year of the FULL_FORCE project, the focus will be on validation and knowledge transfer. As detailed in the overview file of milestones and deliverables (annex), a conservative estimate predicts the publication of at least eleven peer-reviewed publications from the planned work.
Most importantly, our work will level the field for a common strategy for future surveillance of AMR. International consensus states that the dynamics of horizontal gene transfer mediated by plasmids and other mobile integrative elements have to be taken into account in AMR risk assessments. We hope that, by the end of FULL_FORCE and under the umbrella of a coordinated project like the EJP One Health, we have consolidated a pan-European platform for the effective integration of MGE tracking in veterinary and public health, confirming the EU as "best practice" region for AMR surveillance.

Description of work

WP 0: Project Management

WP start/end month: M25 – M60

WP Leader: Pieter-Jan Ceyssens (SCI); **WP participants**: all

This overarching WP ensures proper coordination at both the overall project and the individual WPs, as well as timely reporting of results and budgets according to the formal EU requirements. It will also involve the arrangement of secured transfer of data and strains, and the development of a data management plan. WP0 takes place over the first, the second and the third year of the project.

Task 0.1: MEETINGS AND TELCALLS

Task start/end month: M25-M60

Task Leader: Pieter-Jan Ceyssens (SCI); Task Participants: all (incl. UU, IZSLT)

This task takes place over the three annual periods of the EJP. In its final year, the FULL_FORCE consortium will have its closure meeting at ECCMID 2022. Here, the final achievements will be disseminated by both WP leaders and relevant project participants.
Upcoming to this meeting, the project coordinator and deputy coordinator will continue to perform teleconferences with all WP leaders at the start of every quarter to ensure momentum of the overall project. Dates for teleconferences will be determined using the Doodle web tool. In addition, WP leaders will perform WP teleconferences with relevant WP members according to the individual requirements and deliverables.

Task 0.2: REPORTING

Start/end month: M25-M60

Leader: Pieter-Jan Ceyssens (SCI); Task Participants: WP leaders (SSI, DTU, APHA, INRA, SVA)

This task takes place over the three annual periods of the EJP.The project coordinator will collect detailed reports on deliverables and milestones from WP leaders according to the work plan outlined below. Also, final budget information will be collected from all participants and reported according to the requirements of EU.

Task 0.3: CENTRAL DATA REPOSITORY (finished)

Task 0.4: DATA MANAGEMENT PLAN

Start/end month: M25-M60

Leader: Pieter-Jan Ceyssens (SCI); Task Participants: all.

This task takes place over the three annual periods of the EJP. An evaluation of the DMP will be performed during the closure meeting in ECCMID 2022.

Deliverables

D-JRP19-WP0.D6	Closure meeting report	M54
D-JRP19-WP0.D7	Financial and activity report Y5	M54

WP 1: *SMRT IMPLEMENTATION*

WP1 will take place in the first annual year of FULL_FORCE, and will thus be completed at this time.

WP 2: *GENOME STUDIES*

WP start/end month: M25 – M60. This WP takes place over the three annual years of the project.

WP Leader: Muna anjum (APHA); **Deputy Leader:** Pieter-Jan Ceyssens (SCI); **WP participants**: SSI, ANSES, INSA, BfR, DTU, INRA, ISS, PIWET, PHAS, SSI, RIVM, SVA, WbvR, NVI (+UU, IZSLT)

The general goal of this WP is to apply SMRT sequencing technology on six selected case studies, from cross-sectional and longitudinal studies from research and surveillance projects including EU projects such as EFFORT, COMPARE, ENGAGE and ARDIG, as well as national and EU surveillance activities, for which short read Illumina sequences may already available. Using this additional layer of information, we will be able to compare specific MGEs and their possible evolution in different environments and geography.

Task 2.1 MGE evolution in longitudinal sample sets (ARDIG, ABRES)

Start/end month: M25-M60. This task takes place over the three annual years of the project.
Leader: Mike Brouwer (WbvR); Task Participants: NVI, ANSES, RIVM, WBVR

Resolved genomes of isolates with hybrid assemblies of the IncI1 plasmids under study will be submitted to a repository and used as reference to determine how widespread the plasmids within these isolates are in partner datasets, and across different partner institutes. This will be performed for specific plasmid types e.g. MDR plasmids harbouring genes to HP-CIAs, where the circularised plasmid sequence will be compared to genome assemblies from short-read WGS of all available isolates (up to 500 per partner and through NCBI) using BLASTn type approaches. This will help identify how widespread specific plasmids may be, and if they are present only within a particular study, environment (livestock or human), or geography. Changes in plasmid genomes (e.g. size and content) in isolates from different epidemiological units (human, livestock, and geographic region), will be of particular interest and may help identify factors influencing their evolution.

Task 2.2 MGE evolution in cross-sectional data sets (EFFORT, ENGAGE & National Surveillance)

Start/end month: M28-M60. This task takes place over the three annual years of the project.
Leader: Jens A. Hammerl (BfR); Task Participants: WBVR,INSA, PIWET, PHAS, SSI, DTU, RIVM, APHA, SCI, (IZSLT)

Bioinformatical analyses of the IncK-plasmid diversity in the available WGS datasets of the contributing partners will be finished. Further comparisons will be made with sequences of all contributing partners and/or available sequences of the public databases to get a deeper insight in the evolution of they selected plasmid types globally. Finished plasmid genomes were generated, annotated and submitted to a public repository and/or used for publications. The work of the third year mainly focusses on the assessment of the global impact of the plasmid types for AMR/virulence transfer (i.e. dissemination, adaptability, stability). The detailed plasmid analyses will be of particular interest and may help to assess the impact of mobile genetic elements for the development of novel pathotypes and factors for influencing their evolution. On the basis of the generated results the core and the accessory genome of different plasmid types will be determined.

Task 2.3 *Klebsiella pneumoniae*: the canary in the coalmine

Start/end month: M28-M60. This task takes place over the three annual years of the project.
Leader: Petra Edquist and Alma Brolund (FOHM); Task Participants: ISS, INSA, SCI, NVI, SSI, BfR, (IZSLT)

After hybrid assembly, *K. pneumoniae* from different sectors will be compared, such as human

patients, environment and infected animals as well as geographic origin of the strains. We will also be able to compare *K. pneumoniae* strains with different antibiotic resistance genes, i.e. CPO vs. ESBL. Clinically important resistance and virulence genes will be studied in detail. Epidemiological typing of the strains will enable comparison of populations in the different sectors studied to be able to identify transmission within and between sectors.

Task 2.4 ESBL-producing Enterobacteriaceae in horses – A separated epidemiology of plasmids?
Start/end month: M28-M60. This task takes place over the three annual years of the project.
Leader: Karl Pedersen (SVA); Task Participants: ANSES, INRA, RIVM, (UU, IZSLT)

After hybrid assembly, *t*he association of genes encoding ESBL to specific MGEs will determined, both plasmids and transposon. The plasmid epidemiology will be compared between different geographic settings, clinical vs commensal, and genetic backgrounds. Potential factors influencing selection and sustainment of the specific plasmid and gene combination, or lack thereof, will be identified for example the presences of the fos-operon, involved in the metabolism of fructo-oligosaccharides. Comparisons of data on MGEs and ESBL genes from horses will also be compared to data on MGEs from the other task, to give further insight to the factors influencing occurrence and evolution of the MGE/gene combinations connected to horses.

Task 2.5 Salmonella Infantis and S. Kentucky across reservoirs: role of MGEs
Start/end month: M28-M60. This task takes place over the three annual years of the project.
Leader: Laura Villa (ISS); Task Participants: ISS, SCI, INRA, INSA, PHAS, PIWET, RIVM, SVA, (IZSLT)

Assembled genomes and plasmids of *S.* Infantis and *S.* Kentucky isolates from each partner will be submitted to a repository. The analysis of the assembled genomes obtained and of the ESBL genes associated to specific MGE in different human and animal environment, or in different geographic area will be performed. The analysis, in the project sequence repository, of the diffusion of the specific MGEs associated to ESBL resistance genes derived from S. Infantis and S. Kentucky also present in other species, will be of interest and could be useful to identify factors influencing evolution of these MGEs and ESBL genes.

Task 2.6 Evaluation of publicly available and in-house tools for MGE typing
Start/end month: M30-M54. This task takes place over the three annual years of the project.
Leader: Jannice Schau Slettemeås (NVI); Task Participants: ANSES, Bfr, DTU, APHA, INSA, (UU, IZSLT)

The most applicable tools identified by the task participants during the second year of FULL FORCE will during the third year be applied for comparison of MGEs originating from the different sources explored in tasks 2.1 to 2.5. The tools will be shared among the participants.

Deliverables

D-JRP19-WP2.D13	Paper on plasmid dissemination and evolution from longitudinal studies.	M60
D-JRP19-WP2.D14	Paper on plasmid dissemination and evolution from cross-sectional studies.	M60
D-JRP19-WP2.D15	Paper on the role of MGEs on in the EU wide dissemination of K. pneumoniae	M60
D-JRP19-WP2.D16	Paper on the epidemiology of plasmids in AMR in horses	M60
D-JRP19-WP2.D17	Paper on the role of MGEs on the spread of Salmonella Infantis and S. Kentucky across reservoirs	M60
D-JRP19-WP2.D18	Recommendation of publically available tools for MGE analysis	M60

WP 3: *CULTURE-INDEPENDENT TYPING AND METAGENOMICS*
WP start/end month: M30 – M60

WP Leader: Frank Aarestrup (DTU); **WP participants**: WBVR, APHA, NVI, (UU, IZSLT)
At least an 80% of bacteria present in complex samples such as faeces and soil are uncultivable under routine microbiological procedures. The development of culture-independent methods for detect, quantify and identify bacterial plasmids carrying antimicrobial resistance genes is greatly encouraged for future surveillance efforts. This WP will focus on (i) enhanced mining of existing metagenomics data, including those from the EFFORT and COMPARE projects, and correlate this to AMR-gene abundance, and (ii) development of diagnostic tools for direct identification of MGE/plasmid identifications from various sample types. WP3 takes place over Y3, Y4, and Y5 of the EJP.

Task 3.1 MGE ANALYSES IN METAGENOMIC DATASETS
Start/end month: M30-60. This task will take place in the three annual years of the project.
Leader: Frank Aarestrup (DTU); Task Participants: WBVR, APHA, NVI, (UU, IZSLT)

This task takes place over the three years of FULL_FORCE. In the final year, publicly available metagenomes will be investigated for the presence of MGE and associations between MGE, AMR-genes and taxonomical composition will be determined. A subset of samples (i.e. the EFFORT and parts of the COMPARE samples) will be assembled using meta-genomic binning and the correlation of MGE and AMR-genes studied in further details.

Task 3.2 CULTURE INDEPENDENT METHODS FOR PLASMID IDENTIFICATION
Start/end month: M30-60. This task will take place in the three annual years of the project.
Leader: Mike Brouwer (WbvR); Task Participants: DTU

The last half year the main objective is to detect and quantify of ARGs by the high throughput real time PCR method. The up to 32 singleplex protocols for real time PCR ARG detection will be adapted for having same PCR conditions. Selected EFFORT samples will be analysed by this method. Finally, results obtained by culture independent methods for plasmid identification (SMRT and high throughput real time PCR) will be compared to previously collected metagenome data.

Deliverables

D-JRP19-WP3.D6	Report on the abundance and associations of species, AMR and MGE	M60
D-JRP19-WP3.D7	White paper on the performance of MINion sequencing for direct identification of AMR genes in field samples	M60

WP 4: *FUNCTIONAL CHARACTERIZATION OF AMR MOBILE GENETIC ELEMENTS (MGE)-CARRYING AMR GENES AND BACTERIAL HOST ASSOCIATIONS*
WP start/end month: M25 – M60.
WP Leader: Benoit Doublet (INRA, 19); Deputy WP Leader: Laura Villa (ISS, 27); WP participants: ANSES, INSA, BfR, DTU, APHA, INIA, SCI, PIWET, PHAS, SSI, RIVM, SVA, WbvR, NVI (+UU, UG, IZSLT)
The overall goals of this WP are to (i) gain knowledge on molecular mechanisms of spread and persistence of main MGEs carrying critically/highly important antimicrobial resistances, (ii) identify key molecular interactions between AMR-MGEs and bacterial host important for dissemination and maintenance, and (iii) provide first line evidences for the development of novel exploratory strategies to curb the spread of major AMR-MGEs. WP4 takes place over Y3, Y4, and Y5 of the EJP.

Task 4.1 SELECTION of MGEs and HOST STRAINS FOR DETAILED CHARACTERIZATION (finished)

Task 4.2 FUNCTIONAL CHARACTERIZATION of MGEs
Start/end month: M31-60. This task will take place in the three annual years of FULL_FORCE.
Leader: Benoît Doublet (INRA); Deputy Task Leader: Michael Brouwer (WBVR); Task Participants: ANSES, SCI, INRA, ISS, WBVR, INSA, IZSLT
AMR-MGEs considered of interest will continued to be investigated by molecular functional analysis to identify both the MGE-encoded factors and the bacterial host factors important for dissemination,

stability and maintenance. The initial selected targets are specified in the Annual Work Plan of Y3 (2020), and can be adapted upon results of T4.1 in Y4 (2021). Briefly, *in vitro* conjugation studies will be conducted with selected type- MGEs and host strains. Conjugation assays will be performed from different genetic backgrounds (*Salmonella*, *Klebsiella*, *E. coli*, *Proteus*, etc) of donor strains and recipient strains. AMR-MGEs will be introduced in different host strains and studied for their ability to persist over time in the bacterial host without antimicrobial selective pressure. Genetic factors from MGEs and the host that may influence persistence will be investigated. Beyond the known incompatibility between plasmids of the same Inc group, the capacity of different AMR-MGEs "to live together" in the same host will be also studied. We will share approaches, protocols, molecular tools between involved participants.

Task 4.3 HOST ASSOCIATION STUDIES

Start/end month: M43-60. This task will take place in the second and third annual year of the EJP
Leader: Valeria Bortolaia (DTU); Task Participants: DTU, (UU, IZSLT)

The epidemic successful associations between MGEs and hosts (defined both at the bacterial and at the microbiota level; see description in year 2 of the project for further details) will be investigated in vitro using functional assays and in silico by genome wide association studies (GWAS) to identify ecological factors favoring plasmid persistence.

In year 3, we will add complexity to the plasmid persistence test which was described in year 2, and perform a screen of broader combinations of plasmids and microbiota according to the protocols approved in Y2. These studies will allow us to define the mechanism of AMR plasmid persistence (i.e. mediated by bacterial host survival and/or by horizontal gene transfer) in different bacterial communities, and to assess the relative importance of bacterial host genomic background and microbiota composition in favouring plasmid persistence.

Deliverables

D-JRP19-WP4.D3	Report on biofilm formation of SGI1-K CIP^R *S.* Kentucky ST198	M60
D-JRP19-WP4.D4	Report on conjugative transfer and maintenance of IncHI1-CTX-M plasmids in different *E. coli* genetic backgrounds	M60
D-JRP19-WP4.D5	Report on comparative analysis of horizontal transfer efficiency of different plasmid Inc groups carrying *mcr* genes	M60
D-JRP19-WP4.D6	Report on specific plasmid-host associations of pKpQIL plasmids and transposition of bla_{KPC} transposon unit in KPC-producing *K. pneumoniae* strains	M60
D-JRP19-WP4.D7	Report on host range capacity of pESI plasmid from *S.* Infantis and provided fitness advantages	M60
D-JRP19-WP4.D8	Report on mechanisms of persistence of different AMR plasmids in diverse faecal and sewage bacterial communities	M60

Milestones

M-JRP19-M30	Data on the role of short-chain fructooligosaccharide metabolism in IncHI1 plasmid maintenance	M54
M-JRP19-M31	Data on plasmid-encoded fitness advantages of pESI to the host bacteria	M54

WP 5: *MODELLING*

WP start/end month: M25 – M60. WP5 takes place over Y3, Y4, and Y5 of the EJP.
WP Leader: Stefan Widgren (SVA, 41); **WP participants:** RIVM, BfR, UU - Farm Animal Health

The objectives of WP5 are to address: i) gaps in quantitative knowledge on the spread of pAMR which will be essential to direct future focused research, ii) insight in the uncertainty around the effect of measures reducing pAMR prevalence in the production chains, and iii) identification of key elements in the production chains to mitigate the risk of human exposure.

Task 5.1 MODEL DESIGN for AMR TRANSMISSION (finished)
Task 5.2 EXPOSURE ASSESSMENT of HORIZONTAL and VERTICAL TRANSMITTED AMR
Start/end month: M25-60. This task will take place in the three annual years of the project.
Leader: Eric Evers (RIVM); Task Participants: SVA, UU - Farm Animal Health
In a final subtask, RIVM will lead the **calculation of human AMR exposure** by SimInf and sQMRA, trying to distinguish between horizontal and vertical transmission (**M37-54**). Important will be to reach consensus on demarcations of the work in terms of food animals and AMR types. Also, coupling of SimInf and sQMRA will need careful assessment of input-output relationships. The result will be food-product specific, indicating product-specific public health significance.

Deliverables

D-JRP19-WP5.D4	A report on human AMR exposure based on SimInf and sQMRA calculations	M60

2.4.1.1.11 JRP15-R2-AMR2.1-FED-AMR

Reference to the Strategic Research Agenda (please refer to D2.7)	**AMR 2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer in humans, animals and the environment, including epidemiology of resistant microorganisms and antimicrobials in the environment and their (environment-mediated) spread**									
Research Project Title	**The role of free extracellular DNA in dissemination of antimicrobial resistance over ecosystem boundaries along the food/feed chain**									
Research Project Acronym	**FED-AMR**									
Leading Organisation	**P2-AGES**				Deputy Leading Organisation		**P36-INSA**			
Project Leader	**Werner Ruppitsch**				Deputy Project leader		**Manuela Caniça**			
Project Start month	**M25**				Project End month		**M60**			
Annual period of the OHEJP the work plan applies: Y5										
Participant	1	**2**	4	6	**7**	8	**9**	**10**	11	12
	Anses	**Ages**	Sciensano	NDRVMI	**SZU**	VRI	**BfR**	**FLI**	RKI	DTU
PM		**6,49**			**1,27**		**0,50**	**7,98**		
Participant	**13**	**14**	15	16	17	18	19	**20**	21	22
	SSI	**UT**	VFL	INIA	UCM	MVNA	INRA	**IP**	APHA	PHE
PM	**2,00**	**6,00**						**0,50**		
Participant	**23**	24	**25**	26	27	28	29	30	31	32
	UoS	OKI	**NUIG**	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM	**6,48**		**0,00**							
Participant	**33**	**34**	35	**36**	37	39	40	41	42	43
	NVI	**PIWET**	INIAV	**INSA**	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM	**1,65**	**7,50**		**9,89**						
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Establishment of harmonized and standardized sampling and testing protocols in alignment with the EFFORT project approach
- Establishment of a Scientific Supervisory Board (SB)
- Facilitating inter-institutional communication, exchange of knowledge and expertise
- Organization of kick-off and final project meetings. Support of interim meeting
- Establishing regularly held Webinars and ad hoc Skype Meetings to solve acute problems and allow a smooth progress in project plan
- Development of a data and protocol management plan
- Establishment of a data, results and protocol repository accessible by the partner institutions via internet.
- Support reporting and publishing

Description of work

WP1: Project Management and Communication --> as described in Y3.

WP1 takes place over the first, the second year and the third year of the project (Y3, Y4, Y5)

- Task 1.1, subtasks sT1.1.2, sT1.1.2, task T1.2 and task 1.3 take place over the first, the second year and the third year of the project (Y3, Y4, Y5)
- subtask sT1.1.1 takes place in the first year of the project (Y3)

WP start month: M25;
WP end month: M60;
WP Leader: Werner Ruppitsch
Deputy WP Leader: Adriana Cabal Rosel
WP participants: All (2-AGES, 7-SZU, 9-BfR, 10-FLI, 13-SSI, 14-UT, 20-IP, 23-UoS, 25-NUIG, 33-NVI, 34-PIWET, 36-INSA)
Description of the WP: WP 1 will consist of 3 primary tasks: Task 1.1. will organize the scientific management (SM) of the project. Task 1.2. describes the measures applied for managing administrative and legal activities (AM). Task 1.3. deals with data and protocol management (DPMP). A Scientific Supervisory Board (SSB) constituted by a single representative of each of the 12 participating organizations will control all FED-AMR scientific and administrative activities and decides about all key issues concerning project execution and exploitation of the results. Management is organized by 2-AGES, all remaining institutes nominate a Representative responsible for communicating management issues to and from their local institutions.

Task: JRP15-R2-WP1-T1: Scientific Management
Task start month: M25;
Task end month: M60;
Task Leader: Manuela Caniça
Deputy Task Leader: Adriana Cabal Rosel
Task Participants: All (2-AGES, 7-SZU, 9-BfR, 10-FLI, 13-SSI, 14-UT, 20-IP, 23-UoS, 25-NUIG, 33-NVI, 34-PIWET, 36-INSA)
Description of the task: The scientific management (SM) of the FED-AMR project will be organized by an INSA senior expert who has experience in the management of scientific projects for over 20 years (M. Caniça). She will be assisted by A. Cabal Rosel. The other partners nominate a Representative for the Scientific Supervisory Board (SSB). The SSB will meet in regular intervals to control the progress of the project. A risk management strategy for the project will be defined by the Administrative Manager (AM) and the Scientific Manager (SM), in consultation with the SSB to ensure that adverse situations are properly handled along the course of the project.

Sub-Task: JRP15-R2-WP1-T1.1: Coordination of sampling, laboratory experiments and building a database. Finished in Y3.

Sub-Task: JRP15-R2-WP1-T1.2: Webinar forum and Skype meetings for instant scientific interactions
Sub-Task start month: M29;
Sub-Task end month: M60;
Sub-Task Leader: Mónica Oleastro
Deputy Sub-Task Leader: Markus Wögerbauer
Sub-Task Participants: 2-AGES, 36-INSA
Description of the task: To facilitate interaction and problem solving at regular intervals Webinars will be organized as well as ad hoc Skype meetings. These activities will be co-ordinated by 2-AGES and 36-INSA.

Sub-Task: JRP15-R2-WP1-T1.3: Project Meetings
Sub-Task start month: M25;
Sub-Task end month: M52;
Sub-Task Leader: Manuela Caniça;
Deputy Sub-Task Leader: Karin Rainer
Sub-Task Participants: 2-AGES, 36-INSA;
Description of the task: Project meetings will be held in Vienna (M26,) and Lisbon (M52) trying to bring as many members of the FED-AMR consortium together. However, the meetings will be broadcast via Adobe Connect to those who cannot attend. 2-AGES and 36-INSA will organize the events.

Task: JRP15-R2-WP1-T2: Administrative Management
Task start month: M25;
Task end month: M60;
Task Leader: Karin Rainer
Deputy Task Leader: Christine Feiertag;
Task Participants: 2-AGES;
Description of the task: The administrative management (AM) will be supported by the infrastructure of the AGES academy and the secretariat of the AGES knowledge transfer department. The coordination of joint activities in the frame of the FED-AMR project will be coordinated by AGES (see above). Additionally, each partner will appoint an Administrative Representative who will be in direct contact with the AGES Administrative Manager (AM). A risk management strategy for the project will be defined by the Administrative Manager (AM) and the Scientific Manager (SM), in consultation with the Scientific Supervisory Board (SSB) to ensure that adverse situations are properly handled along the course of the project.

Task: JRP15-R2-WP1-T3: Data and Protocol Management.
Task start month: M25;
Task end month: M58;
Task Leader: Manuela Caniça;
Deputy Task Leader: Alexandre de Menezes;
Task Participants: All Description of the task: The SSB of the FED-AMR consortium will start to develop a Data and Protocol Management Plan (DPMP) at the Kick-off Meeting and aims to have a final DPMP available by M31. The DPMP will determine which data will be collected, processed or produced, which techniques and standards will be used, whether data and/or protocols will be shared and made publicly available, whether and how they will be made accessible for verification and/or reuse, and how they will be curated and stored (even after the end of the project period). The database will be curated and updated in regular intervals.

Deliverables		
Ref	Title	**Due month**

D-JRP15-FED-AMR-WP1.7	Final project report (T1.3.)	M59
Milestones		
Ref	Title	**Due month**
M-JRP15-FED-AMR-05	Final meeting (T1.3.)	M60

Objectives

- As determined in detail in the description for WP2 in the annual workplan for year 3.

Description of work

WP2: Field experiments: Determination of the naturally occurring ARG background load and microbial biodiversity in the tested environmental compartments – Longitudinal study over a crop growing season (1 year).

- WP2 takes place over the first, second and third year of the project (Y3, Y4 and Y5)
- Tasks 2.1. and 2.2. take place in the first year (Y3)
- Tasks 2.3. and 2.4. take place over the first and second year of the project (Y3 and Y4)
- Tasks 2.5. and 2.6. take place over the second year (Y4)
- Task 2.7. takes place over the first, second and third year of the project (Y3, Y4 and Y5).

WP start month: M25
WP end month: M54
WP Leader: Manuela Caniça
Deputy WP Leader: Adriana Cabal Rosel
WP participants: 2-AGES, 7-SZU, 14-UT, 23-UoS, 25-NUIG, 33-NVI, 36-INSA
Description of the WP: Please see relevant description for WP2 in the annual work plan for year 3.

Task: JRP17-R2-**WP2-T7**: *Isolate and assess quantity, diversity and stability of free extracellular ARG encoding DNA in the tested environments. Sequence comparisons.*
Will be performed as described for WP2-T7 in the annual work plan for year 3.

Deliverables

Ref	Title	Due month
D-JRP15-FED-AMR-WP2.7	Quantity and stability of free extracellular DNA observed in environmental compartments tested so far (T2.7)	M50
D-JRP15-FED-AMR-WP2.9	ARG dynamics in an agricultural testing area: Response of ARG concentrations according to different fertilisation techniques and crops over an annual growth period (WP2)	M54
D-JRP15-FED-AMR-WP2.10	Final report on WP2 and draft version of peer-reviewed publication (WP2)	M58

Milestones

Ref	Title	Due month
M-JRP15-FED-AMR-24	Delivery of final annual report on WP2 + draft version of peer reviewed paper (WP2)	M54

Objectives

- Evaluation of *C. difficile* as a zoonotic agent and it's transmission networks
- Evaluation of the zoonotic versus anthropogenic AMR transmission using *C. difficile* as a model organism

Description of work

WP3: Elucidating the role of Clostridiums difficile as an ARG transfer platform over ecosystems boundaries and its linkage between human and non-human (zoonotic) reservoirs

WP3 takes place over the third and the fourth year of the project

WP start month: M25
WP end month: M58

WP Leader: Mónica Oleastro
Deputy WP Leader: Søren Persson
WP participants: 9-BfR, 10-FLI, 14-UT, 20-IP
Description of the WP: *C. difficile* is one of the most important causes of healthcare-associated infections worldwide, and is capable of causing significant enteric disease in various animal species, including farm animals. There is increasing evidence that C. difficile may have a foodborne or zoonotic etiology. In addition, AMR is frequently reported in epidemic *C. difficile* strains and is thought to play a major role in the infection and dissemination of this pathogen. C. difficile has also been suggested as a reservoir/receptor of resistance genes that might be transferred to other species in the host gut as well as in the environment. The existence of indistinguishable ribotypes and toxin gene profile is extensively described in the literature suggesting that zoonotic or anthropogenic transmission of *C. difficile* may be occurring, although the true extent of genetic overlap between these populations and the environment remains to be determined. Characterising the overlap of *C. difficile* genotypes in different reservoirs can improve our understanding of possible transmission routes of this pathogen and AMR associated determinants. This WP is organized into four tasks that will address the epidemiology of zoonotic *C. difficile*, the genetic overlap between human and non-human *C. difficile* lineages, as well as its role as an ARG transfer platform over ecosystems boundaries.

Task: FED-AMR2.2-WP3-T3 - Evaluation of the extent of genetic overlap between human and non-human *C. difficile* lineages
Task start month: M39
Task end month: M58
Task Leader: Mónica Oleastro
Deputy Task Leader: Søren Persson
Task Participants: 9-BfR, 10-FLI 14-UT, 20-IP
Description of the task: Characterising the overlap of *C. difficile* genotypes in different reservoirs can improve our understanding of possible transmission routes of this pathogen. This aim of this task is to define the extent of genetic overlap and potential transmission between human and non-human lineages. Whole-genome sequencing data from strains isolated from different sources will be analysed in order to:
i) infer the phylogenetic relationship between strains, through the alignment of genomes and extraction of core single-nucleotide variant positions, ii) describe the general trends of the core-genome determined within the dataset, and iii) identification of mobile genetic elements (MGE), such as prophages, transposons or plasmids, and potentially associated antimicrobial resistance (AR) determinants, using several assembly- and read-based tools (MGE: plasmidFinder, pATLAS, PHASTER; AR: Abricate, ARIBA) and public reference databases (NCBI, ResFinder, CARD). The required bioinformatics workflows are well established in the Bioinformatics Unit of INSA.

Task: FED-AMR2.2-WP3-T4 - *C. difficile* / AMR dissemination between the human, animal and the environment: pig farm as a proof of concept
Task start month: M39
Task end month: M58
Task Leader: Christian Seyboldt
Deputy Task Leader: Sven Maurischat
Task Participants: 13-SSI, 14-UT, 20-IP, 36-INSA
Description of the task: Task finished in Year 4.

Deliverables

Ref	Title	Due month
D-JRP15–FED-AMR-WP3.2	Overview of genetic overlap between human and non-human *C. difficile* isolates (task 3.2 and task 3.3)	M58

D-JRP15–FED-AMR-WP3.3	Classification of pig farm compartments according to their role in the epidemiology of *C. difficile* (task 3.4).	M58
Milestones		
Ref	Title	Due month
M-JRP15–FED-AMR-28	Genetic overlap-analysis human vs. non-human	M58
M-JRP15–FED-AMR-29	Identification of transmission network as described above	M58

Objectives

The overall objective of the WP4 is the determination of the selection pressures in the tested compartments of human, animal and environmental ecosystems.
The specific objectives are the same as in Years 3 and 4.

Description of work

WP4: *Determination of the selection pressures in the tested compartments of human, animal and environmental ecosystems*

WP4 takes place over the first, second and third year of the project (Y3, Y4, Y5). Tasks 4.1. and 4.2. take place in the first year (Y3). Tasks 4.3 - 4.7. take place over the first, second and third year of the project (Y3, Y4, Y5).
WP start month: M25.
WP end month: M50.
WP Leader: Martin Brandtner (2-AGES).
Deputy WP Leader: Anna Gajda/Małgorzata Gbylik-Sikorska (34-PIWET).
WP participants: 2-AGES, 23-UoS 34-PIWET, 36- INSA
In this WP selection pressures will be determined by the quantification of residues of antimicrobials (like tetracyclines, sulfonamides, macrolides and fluoroquinolones), herbicides, and heavy metals. Measurements of the concentration of trace elements in environmental samples from participant countries will reveal their relationship to induction of competence in naturally transformable bacteria. The analysis of antibiotics in animal faeces is important to obtain more insight in the possible formation of bacterial resistance in the animals' gut. The quantification of antimicrobials will be performed with an Agilent Series 1200 HPLC system connected with an API 4000 triple quadrupole mass analyser with a TurboIonSpray source (Sciex, Canada) or on the UHPLC/HPLC Shimadzu Nexera X2 (Shimadzu, Japan) system connected to the QTRAP®4500/QTRAP®5500 triple quadrupole mass spectrometer (Sciex, Framingham the USA); liquid chromatography - tandem mass spectrometry (LC-MS/MS).

Task JRP15-R2-**WP4-T1 Selection of essential antimicrobials to be quantified in the tested compartments (published antibiotic consumption data, farmers' questionnaire, personal experience, expert interviews (veterinarians)**
Task start month: M25.
Task end month: M30.
Task Leader: Martin Brandtner (2-AGES).
Deputy Task Leader: Anna Gadja/Małgorzata Gbylik-Sikorska (34-PIWET).
Task Participants: 2-AGES, 23-UoS, 34-PIWET.
Task finished in Y3.

Task JRP15-R2-**WP4-T2 Quantification of four antimicrobial classes (tetracyclines, macrolides, sulphonamides and fluoroquinolones) in aqueous matrices (water)**
Task 4.2 start month: M31.
Task 4.2 end month: M50.
Task Leader: Anna Gajda/Małgorzata Gbylik-Sikorska (34-PIWET).
Deputy Task Leader: Martin Brandtner (2-AGES).
Task Participants: 34-PIWET

Task is executed as described in WP4 T4.2 in year 3 (Y3).

Task JRP15-R2-**WP4-T3 Quantification of four antimicrobial classes (tetracyclines, macrolides, sulphonamides and fluoroquinolones) in manure**
Task start month: M31.
Task end month: M50.
Task Leader: Anna Gajda/Małgorzata Gbylik-Sikorska (34-PIWET).
Deputy Task Leader: Martin Brandtner (2-AGES).
Task Participants: 2-AGES, 34-PIWET
Task is executed as described in WP4 T4.2 in year 3 (Y3).

Task JRP15-R2-**WP4-T4 Quantification of four antimicrobial classes (tetracyclines, macrolides, sulphonamides and fluoroquinolones) in faeces**
Task start month: M35.
Task end month: M50.
Task Leader: Anna Gajda/Małgorzata Gbylik-Sikorska (34-PIWET).
Deputy Task Leader: Martin Brandtner (2-AGES).
Task Participants: 2-AGES, 34-PIWET
For technical details on the execution of this task see task 4.2.

Task JRP15-R2-**WP4-T5 Quantification of four antimicrobial classes (tetracyclines, macrolides, sulphonamides and fluoroquinolones) in soil**
Task start month: M31.
Task end month: M50.
Task Leader: Anna Gajda/Małgorzata Gbylik-Sikorska (34-PIWET).
Deputy Task Leader: Martin Brandtner (2-AGES).
Task Participants: 2-AGES, 34-PIWET
For technical details on the execution of this task see task 4.2.

Task JRP15-R2-**WP4-T6 Quantification of herbicides in agricultural soil**
Task start month: M31.
Task end month: M50.
Task Leader: Martin Brandtner (2-AGES).
Deputy Task Leader: Adriana Cabal Rosel (2-AGES).
Task Participants: 2-AGES
In this task a representative list of herbicides will be quantified by an AGES associated sister company (UBA: Environmental Protection Agency in Vienna) according to established in-house/standard protocols.

Task JRP15-R2-**WP4-T7 Measurement of the concentration of trace elements in environmental samples gathered across participants countries**
Task start month: M31.
Task end month: M53.
Task Leader: Mónica Felipe-Sotelo (23-UoS).
Deputy Task Leader: Martin Brandtner (2-AGES).
Task Participants: 2-AGES, 23-UoS

In this task the sample preparation involves replicate procedures and different chemical methods depending on the 'nature' of the sample. All bio-materials (fluids/tissues, plants) are dried at 80˚C or 6 hours (to constant weight). The samples will be analysed by an Agilent 7700 inductively coupled plasma mass spectrometer. The resultant data is checked for accuracy and precision by Excel and the

subsequent sample data is calculated (blank and internal standard checked) to produce the final database of elemental values for statistical analysis
Monica Felipe Solteo is currently on maternity leave, no direct proxy has been appointed as of yet, the sample processing will be performed at UoS by Cameron Wallin. During most of 2021 the ICP-MS was out of order. As of yet (September 2021) the equipment is awaiting repair by the manufacturer. Analysis will be taken up as soon as the ICP-MS is running again.

Deliverables

Ref	Title	Due month
D-JRP15-FED-AMR-WP4.2	Quantitative results of antibiotics in water	M50
D-JRP15-FED-AMR-WP4.3	Quantitative results of antibiotics in manure	M50
D-JRP15-FED-AMR-WP4.4	Quantitative results of antibiotics in faeces	M50
D-JRP15-FED-AMR-WP4.5	Quantitative results of antibiotics in soil	M50
D-JRP15-FED-AMR-WP4.6	Quantitative results of herbicides in environmental samples	M50
D-JRP15-FED-AMR-WP4.7	Quantitative results of trace elements in environmental samples	M53

Milestones

See Year 3

Objectives

- Evaluate the effect of different environmental conditions on ARG HGT rates using Escherichia coli (transformation) and Clostridium (conjugation) as prototype gene-transfer platforms.
- Identify conditions favouring induction of competence in recipient bacteria in agricultural soils.

Description of work

WP5: Identification of environmental conditions modulating transformation frequencies in soil microcosms and an *in vitro* porcine gut model (poGutMo) (laboratory studies).

WP5 takes place over the first, the second and the third year of the project.

- T5.1 takes place over the first and the second year of the project.
  - T5.1 is split into 4 sub-tasks, each lasting 2-3 months.
- T5.2 takes place over the second and the third year of the project.
  - T5.2 is split into 3 sub-tasks, each representing a block of experiments that build iteratively with input from WP4 and input from, and output to, WP6. The first 2 sub-tasks take place in the second year and the final sub-task takes place in the third year.
- T5.3 takes place over the second and the third year of the project.

WP start month M32
WP end month M56
WP Leader: Mark Chambers
Deputy WP Leader: Roberto La Ragione
WP participants 23-UoS
Description of the WP: The focus of this work package will be novel work to assess the environmental effects on transformation and conjugation frequencies in a porcine gut model (poGutMo). The experiments described in **Task 1** will be performed in the absence of the selective pressure of antibiotics or herbicides to establish baseline levels of HGT in the model organisms (*Escherichia coli* and *Clostridium*) arising from transformation and conjugation, respectively. As we are also interested in the role of trace/heavy metals in driving HGT, we shall subject a portion of each sample taken from the

poGutMo to ICP-MS (WP4) so we can relate the frequency of HGT by transformation and conjugation to the concentration of metals within the sample. Work undertaken in WP4 and WP6 will identify the most likely drivers of HGT through transformation and the emergence of AMR. We suspect these will be a combination antibiotic/herbicide and heavy metals, including other environmental conditions that favour the development of transformation competence. These candidate drivers will be evaluated in the gut model in **Task 2** using the approaches described for T1, but this time supplementing the poGutMo with appropriate concentrations of antibiotic, herbicide, and cation. MC will take responsibility for delivery of this WP to time and to budget. Should he be absent for any reason, this responsibility will be undertaken by RLR. The laboratory work will be undertaken by Dr Marwa Hussain Ali Hassan who will meet weekly with MC and/or RLR to review progress. Dr Hussain will be supported in the laboratory by other PDRAs working the gut models in the group of RLR. **Task 3** will establish a soil microcosm according to Trevors et al., 1990, and test the effects of environmental stimuli on transformation of *A. baylyi**.

*Since *E. coli* is not an appropriate model organism for bacterial transformation in soil environments, *A. baylyi* was selected for this task, as planned in the original project proposal.

Task: JRP15-R2-**WP5-T2** Evaluate conditions that drive HGT and the emergence of AMR via transformation
Task start month 49
Task end month 56
Task Leader: Mark Chambers
Deputy Task Leader: Roberto La Ragione
Task Participants: 23-UoS
Description of the task: T2 continues into the third year of the project, representing the second (sT2.2) of two experiments (sT2.1-2.2). This is the final experiment in which the outputs from the models developed in WP6 will be used to refine the test conditions in the poGutMo.

Task: JRP15-R2-**WP5-T3** Effect of different environmental conditions on the expression of competence genes in *Acinetobacter baylyi* determined using soil microcosms

Task start month 44
Task end month 52
Task Leader: Markus Wögerbauer
Deputy Task Leader: Sonia Galazka
Task Participants: 2-AGES
Description of the task: T3 continues into the third year of the project, representing the final round of the soil microcosm experiments and reporting of the results.

Deliverables

Ref	Title	Due month
D-JRP15-FED-AMR-WP5.7	Second round of experiments using PCR amplicons as ARG donors	M51
D-JRP15-FED-AMR-WP5.8	Results from pig gut model regarding HGT by transformation and conjugation in presence of selected antibiotics, herbicides and heavy metals	M52
D-JRP15-FED-AMR-WP5.9	Results from pig gut model regarding HGT by transformation and conjugation in presence of selected antibiotics, herbicides and heavy metals	M49
D-JRP15-FED-AMR-WP5.10	Results from pig gut model regarding HGT by transformation and conjugation in presence of selected antibiotics, herbicides and heavy metals	M53
D-JRP15-FED-AMR-WP5.11	First results from soil microcosm experiments on effects of environmental conditons on transformation	M47

D-JRP15-FED-AMR-WP5.12	Results from pig gut model regarding HGT by transformation and conjugation in presence of selected antibiotics, herbicides and heavy metals	M51
D-JRP15-FED-AMR-WP5.13	Results of the soil microcosm experiments regarding environmental effects on competence gene expression	M52
Milestones		
Ref	Title	Due month
M-JRP15-FED-AMR-40	Samples from gut model experiments set B stored for trace element analysis (WP4)	M52
M-JRP15-FED-AMR-41	Samples from gut model experiments set C stored for trace element analysis (WP4)	M56
M-JRP15-FED-AMR-42	DNA sent for whole-genome sequencing	M55
M-JRP15-FED-AMR-43	Antibiotics, herbicides and heavy metals most likely to drive HGT through transformation supplied to UoS.	M51
M-JRP15-FED-AMR-44	Samples from gut model experiments stored for trace element analysis (WP4)	M50
M-JRP15-FED-AMR-45	Deliver results from 1st round of gut model experiments to WP6 leader for further modelling	M49
M-JRP15-FED-AMR-46	Results from modelling in WP6 communicated to inform parameters for use in 2nd round of gut model experiments	M49
M-JRP15-FED-AMR-47	Deliver results from 2nd round of gut model experiments to WP6 leader for further modelling	M53
M-JRP15-FED-AMR-52	Deliver results from soil microcosm experiments to WP6 leader for final modelling	M52

Objectives

- Systematically review the literature to investigate the impact of environmental factor on Antimicrobial resistance
- Developing mechanistic models to elucidate environmental driven spatio-temporal changes observed in microbiological communities and how these are linked with AMR
- Use the models for informed risk assessment for public health

Description of work

WP6 takes place over the first, the second and the third year of the project. It consists of two tasks (T6.1 and T6.2).

WP6: Probabilistic and mechanistic models of the links between antimicrobial usage in animals, AMR in the environment, and the risks for public health.
WP start month: M32
WP end month: M60
WP Leader: Giovanni Lo Iacono
Deputy WP Leader: Mark Chambers
WP participants: 23-UoS
Description of the WP: In line with Objective O5, WP6 is intrinsically multidisciplinary. Accordingly, we will use mathematical modelling and review of the literature to:

i) *Detect relevant variables (predictors) which can predict observed appearance and transmission of ARGs in different environmental compartments (Task 6.1).* To address this objective the initial plan was to use a machine learning approach, trained with data provided by other WPs. However, due to challenges in obtaining the data required for setting up a machining learning model (in part related to COVID-19 restrictions), the workflow of WP6.1 was since changed to

initially carry out a systematic review of the literature regarding environmental factors of AMR prevalence The idea is that the data extracted as part of this systematic review will be used to inform the design of a future machine learning model. This revised deliverable provides the protocol for such a systematic review.

ii) *Gain insight of the mechanisms underlying transmission dynamics of resistant bacteria (Task 6.2).* Microbiological communities (either within host or in the natural environment) are affected by the external environmental drivers (e.g. temperature and pH) and by mutual influences within the community (e.g. competition for resources). Both factors impact on the spatiotemporal patterns of the community, potentially leading to the extinction/establishment of specific (e.g. resistant) microorganisms. In Task 6.2, we will develop and apply models to investigate if and how the resilience of microbiological communities changes when subjected to: i) different external drivers and ii) internal drivers represented, for instance by richer biodiversity; this last point will provide a theoretical testing of Hypothesis H2. Furthermore, we will investigate how perturbation of the environmental drivers (which we can reproduced in the porcine gut model, Task 5.1) can critically reduce/enhance the population of specific microorganism (*1*). This will lead to a better understanding of the mechanism, at population level, of extinction/emergence and transmission dynamics of resistant microorganisms (in line with objective O1 in WP2). The WP will also help in understanding some macro-ecological relationships observed in the gut (*2*) and potentially relevant to other systems.

iii) *Assess and identify associated risks to public health and strategies to mitigate these (Task 6.1 and 6.2).*

The WP will identify relevant environmental drivers (i.e. risk factors) of observed AMR. It will elucidate the possible mechanism leading to the observed spatiotemporal dynamics (increasing/decreasing the risk) of the microbiological communities. The modelling approach can be formulated and applied to within-host microbiological communities (e.g. in the gut) or in the natural environment (e.g. in soil). In the latter case, as these dynamics depends on environmental drivers which are varying geographically, the task is relevant to objective O3. Insights from the model will provide crucial information for risk management options for public health (WP6).

Finally, understanding how environmental perturbations affect the extinction or establishment of a pathogen will provide risk management options for the control of disease (e.g. developing a protocol which maximizes efficiency in the use of antibiotics by identifying optimal temporal patterns in their deployment (*1*)).

Task: JRP15-R2-**WP6-T1 Build a probabilistic mathematical model of the emergence of AMR in target bacteria and the relative contribution of transformation and conjugation to ARG acquisition (afterwards: Factors influencing the prevalence of antibiotic resistance in the environment)**

Task start month 32

Task end month 60

Task Leader: Giovanni Lo Iacono

Deputy Task Leader: Mark Chambers

Task Participants: 23-UoS

Description of the task: Human, environmental, and animal health are increasingly threatened by the emergence and spread of antimicrobial resistance. Inappropriate use of pharmaceutical treatments can commonly contribute to this threat, but it is also becoming apparent that environmental factors can play a significant role. This study seeks to identify the environmental factors which may be associated with the emergence or dissemination/transmission of antimicrobial resistance by looking at two aspects: first, the association between the prevalence of antibiotic resistance vehicles in the environment, such as antibiotic resistant bacteria and antibiotic resistance genes, and the level of exposure to suspected causes / indicators of antibiotic resistance. Second, the prominent mechanisms of horizontal genes transmission involved in the spread of antibiotic resistance, such as sampling sites

conditions. This systematic review will be conducted in adherence to the guidelines of the PRISMA statement for systematic reviews and meta-analyses.

Sub-Task: JRP15-R2-**WP6-T1-ST1 Data Integration, Annotation and Association Analysis (afterwards: Systematic review: environmental factors associated with AMR)**
This subtask involves conducting a systematic review of the scientific literature addressing the question: which environmental factors are associated with the prevalence of antimicrobial resistance? To this end, a protocol will be setup to describe the methodology of this systematic review, framed according to the PRISMA-P statement; PRISMA-P is widely considered to be a good practice guideline for conducting high quality systematic reviews. This protocol will be registered with an online registry or published as a prospective report in a journal for peer-review. Following this, the systematic review will be carried out following this protocol. The data items extracted from identified articles are expected to be useful for future machine learning analysis / mathematical modelling.

Sub-Task start month 32
Sub-Task end month 60
Sub-Task Leader: Giovanni Lo Iacono
Deputy Sub-Task Leader: Mark Chambers
Sub-Task Participants: 23-UoS

Task: JRP15-R2-**WP6-T2 Develop mechanistic models to address key questions regarding the spatio-temporal changes observed in microbiological communities**.
Task start month M34
Task end month M60
Task Leader: Giovanni Lo Iacono
Deputy Task Leader: Mark Chambers
Task Participants: 23-UoS
Description of the task: T6.2 takes place over the first, the second and the third year of the project. T6.2 addresses two objectives, concerning the scientific questions identified in point (*ii)* in the description of the WP6 ("Gain insight of the mechanisms.."); these issues will be investigated in parallel with point (*iii)* to identify which mechanisms and how they are potentially responsible for increasing the risk for public health.
Sub-Task: JRP15-R2-**WP6-T2-ST1 Modelling microbial communities I (M34-M60).**
Sub-Task: JRP15-R2-**WP6-T2-ST2 Modelling microbial communities II (M46-M54).**

Modelling microbial communities I and II. In these subtasks we will investigate *How a periodic perturbation in the drivers (e.g. temperature or pH, identified in WP4) affects the dynamics of the microbial community and whether this can be the origin of the emergence of new strains.*
We want to understand if and how the evolution of a pathogen can be delayed/accelerated by temporal fluctuations (resulting in bottlenecks) occurring in the system (*1*). According to the model (*1*), large fluctuations in a dynamic system can enhance extinction of the pathogen, especially of the emerging mutant strains. Furthermore, periodically forced systems oscillate at larger amplitude at some frequencies than at others (resonance), then by adequately perturbing the system we can cause massive fluctuations in the small pathogen population increasing the chances of extinction.
To address this point, we will analyse the data produced in the porcine gut model (in Task 5.1) by using wavelet analysis (*5*) (we will ensure that the temporal domain is long enough). The technique will detect potential natural frequencies of the system, i.e. the frequency at which a system tends to oscillate in the absence of any driving or damping force.
Identifying the existence of natural frequencies in a microbial community is already an important result *per se*, in addition we will link the data with the model to investigate how these frequencies depend on the relevant parameters (e.g. growth rate of bacterial species).

Finally, if feasible, we propose to use the gut model in Task 5.1 to alternate the externals drivers (e.g. source of nutrient) according to the natural frequencies of the system and thus test the hypothesis that the perturbation will cause massive fluctuations. If this will be experimentally confirmed, we could exploit the source of temporal fluctuations to alleviate the disease, reduce chemical control or drugs, and in general, mitigate the risk of developing highly harmful pathogens (e.g. superbugs insensitive to antibiotics).
For the modelling part, GL will supervise the task while an appointed PDRA (Dr Brian Gardner) will lead the work. MAC and Dr Hussain in WP5 will lead the experimental part in the gut model.
Sub-Task start month M34
Sub-Task end month M60
Sub-Task Leader: Giovanni Lo Iacono
Deputy Sub-Task Leader: Mark Chambers
Sub-Task Participants: 23-UoS

1. G. Lo Iacono, F. van den Bosch, C. A. Gilligan, *PLos Comp. Bio.* **9**, e1002870 (2013).
2. B. W. Ji, R. U. Sheth, P. D. Dixit, D. Vitkup, *bioRxiv*. **1**, 370676 (2018).
3. R. M. (Robert M. May, *Stability and complexity in model ecosystems* (Princeton University Press, second., 2001).
4. G. Lo Iacono *et al.*, *Proc. Natl. Acad. Sci.*, 201803264 (2018).

Deliverables

Ref	Title	Due month
D-JRP15-FED-AMR-WP6.2	Findings presented at one international conference and one national conference.	M54
D-JRP15-FED-AMR-WP6.4	Submission/publication of 1/2 paper(s) on how resilience of microbial communities depends on external environmental drivers and richness and diversity of the community.	M54
D-JRP15-FED-AMR-WP6.5	Main code for the mathematical modelling made available in public repository (e.g. GitHub) with associated documentation (which can be used as “Material and Method” section of the forthcoming publications).	M54
D-JRP15-FED-AMR-WP6.7	Findings presented at one international conference and one national conference.	M54
D-JRP15-FED-AMR-WP6.8	Submission/publication of 1 paper on how temporal fluctuating systems affect the potential emergence of resistant strains.	M54
D-JRP15-FED-AMR-WP6.9	Final update of codes and documentations in public repository (e.g. GitHub).	M54

Milestones

Ref	Title	Due month
M-JRP15-FED-AMR-60	Analysis of data produced from the 3rd and final round of gut model experiments. Formulation and implementation of the model to identify how natural fluctuations depend on the drivers. Results communicated to WP5 leader.	M56
M-JRP15-FED-AMR-61	Application of the model to address specific questions and dissemination of findings in peer-reviewed publications and conferences.	M54
M-JRP15-FED-AMR-62	Finding presented at one international conference and one national conference.	M54
M-JRP15-FED-AMR-63	Submission/publication of 1 paper on how temporal fluctuating systems affect the potential emergency of resistant strains.	M54

2.4.1.1.12 JRP16-R2-ET2.2-TELE-Vir

Reference to the Strategic Research Agenda (please refer to D2.7)	**ET 2.2: Development of a toolkit to characterize emerging threats by combining genomic and phenotypic information**									
Research Project Title	**Point-of-incidence toolbox for emerging virus threats**									
Research Project Acronym	**TELE-Vir**									
Leading Organisation	**P13-SSI**				Deputy Leading Organisation			**P16-INIA**		
Project Leader	**Anders Fomsgaard**				Deputy Project leader			**Jovita Fernández-Pinero**		
Project Start month	**M25**				Project End month			**M60**		
Annual period of the OHEJP the work plan applies: Y5										
Participant	**1**	2	**4**	6	7	**8**	9	10	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	**VRI**	BfR	FLI	RKI	DTU
PM	**12,00**		**1,00**			**0,00**				
Participant	**13**	14	15	**16**	17	18	19	20	21	22
	SSI	UT	VFL	**INIA**	UCM	MVNA	INRA	IP	APHA	PHE
PM	**2,10**			**1,80**						
Participant	**23**	24	25	26	27	**28**	**29**	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	**IZSAM**	**IZSLER**	RIVM	WbvR	FHI
PM	**5,10**					**3,50**	**16,50**			
Participant	**33**	**34**	35	**36**	37	39	40	**41**	42	43
	NVI	**PIWET**	INIAV	**INSA**	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**1,50**	**5,00**		**19,86**				**6,00**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										
Objectives										

The overall objective is to develop a very fast point-of-incidence (poi) toolbox for identification and characterization of potentially all emerging virus threats for humans and/or domestic and wildlife animals.

Description of work

WP1: Coordination and data management

WP start month: M25
WP end month: M60
WP Leader: Katja Spiess, SSI
Deputy WP Leader: Miguel Ángel Jiménez-Clavero, INIA
WP participants: All
Description of the WP1: WP1 is the coordination WP and takes place over the first, the second and the third year of the TELE-Vir project.

WP1 is divided into 6 tasks:

WP1-T1: Coordination and project management
WP1-T2: Data management
WP1-T3: Kick-off-meeting at IZSAM, Italy
WP1-T4: 1st TELE-Vir Online, organized by SSI
WP1-T5: 2nd TELE-Vir meeting at SSI, Denmark
WP1-T6: Poi-Toolbox workshop

Description of the WP1-Tasks for the 3rd year of the TELE-Vir project:

WP1-T1: Coordination and project management
Task start month: M25
Task end month: M54
Task Leader: Katja Spiess, SSI
Deputy Task Leader: Miguel Ángel Jiménez-Clavero, INIA
Task Participants: All
Description of the WP1-T1: WP1-T1 takes place over the first, the second and the third year of the project. The main tasks of WP1-T1 are;
1) Overall project management including contact to OHEJP, reporting to OHEJP etc.
2) Coordinate regular telecoms between the participating laboratories
3) Write project newsletters to participants

WP1-T2: Data management
Task start month: M25
Task end month: M60
Task Leader: Katja Spiess, SSI
Deputy Task Leader: Miguel Ángel Jiménez-Clavero, INIA
Task Participants: All
Description of the WP1-T2: WP1-T2 takes place over the first, the second and the third year of the project. The main task of WP1-T2 in the 3rd year is;
1) Continuously updating of the TELE-Vir DMP

WP1-T5: 2nd TELE-Vir meeting at SSI, Denmark
Task start month: M54
Task end month: M54
Task Leader: Katja Spiess, SSI
Deputy Task Leader: Vítor Borges, INSA
Task Participants: ALL
Description of the WP1-T5: WP1-T5 takes place over the third year of the project. The main task of WP1-T5 is to;

1) Organize and host the 2nd TELE-Vir meeting in Copenhagen, Denmark in June 2022

WP1-T6: Poi-Toolbox workshop
Task start month: M49
Task end month: M54
Task Leader: Katja Spiess, SSI
Deputy Task Leader: Vítor Borges, INSA
Task Participants: ALL
Description of the WP1-T6: WP1-T6 takes place in the third year of the project. The main tasks of WP1-T6 are to;
1) Organize and host the 3 day workshop in the Poi-toolbox in Copenhagen, Denmark in June 2022
2) Train all participants in the poi protocol for MinION sequencing in the field
3) Train all participants in the poi data analysis

WP2: Development of a Bioinformatics tool-kit for POI data analysis

WP start month: M25
WP end month: M60
WP Leader: Vítor Borges, INSA
Deputy WP Leader: Daniel Horton, UoS
WP Participants: INSA, UoS
Description of the WP2: WP2 is the bioinformatics WP and takes place over the first, second and third year of the project.
The goal is to develop an open-sourced bioinformatics platform that allows the user-friendly handling of high-throughput sequencing data (second and third generation) for detection and monitoring of viral emerging threats.

WP2 is divided into 5 tasks:

WP2-T1: Survey and collection of databases for genotype-phenotype associations
WP2-T2: Development of bioinformatics modules for third-generation sequencing analysis and pathogen identification
WP2-T3: Development of bioinformatics modules for sequence curation and phenotypic association
WP2-T4: Development of bioinformatics modules for genomic and metadata integration towards enhanced surveillance
WP2-T5: Development of a user- and surveillance-oriented web-based interface

Description of the WP2-Tasks for the 3rd year of the TELE-Vir project:

WP2-T4: Development of bioinformatics modules for genomic and metadata integration towards enhanced surveillance
Task start month: M25
Task end month: M60
Task Leader: Daniel Horton, UoS
Deputy Task Leader: Vítor Borges, INSA
Task Participants:
Description of the WP2-T4: WP2-4 takes place over the first, second and third year of the project.
The main tasks of WP2-T4 are:
1) Dynamic refinement of bioinformatics functionalities for genomic and metadata integration based on the partners testing on behalf of WP5

WP2-T5: Development of a user- and surveillance-oriented web-based interface
Task start month: M25
Task end month: M60
Task Leader: Daniel Horton, UoS

Deputy Task Leader: Vítor Borges, INSA
Task Participants:
Description of the WP2-T5: WP2-5 takes place over the first, second and third year of the project. The main task of WP2-T5 is:
1) Dynamic refinement of the usability of the whole platform based on the partners testing on behalf of WP5

WP3: Development of a protocol for POI MinION sequencing

Task start month: M25
Task end month: M54
SOPs for sample handling and pretreatment (JRP16-WP3-T1), for nucleic acid purification (JRP16-WP3-T2), and for NGS library prep and MinION sequencing (RNA/DNA) (JRP16-WP3-T3) will be finalised and shared with the Tele-Vir partner for a first "in-lab" evaluation on clinical samples in parallel with planned validations in SSI prior to the implementation of the SOPs in the field (WP4).

WP4: Testing of the POI tool-box in the field

WP start month: M55
WP end month: M60
WP Leader: Daniel Ruzek, VRI (we will find a replacement for Daniel Ruzek, as we already discussed it in our monthly Tele-Vir meeting that it can be compensated)
Deputy WP Leader: Katja Spiess, SSI
WP participants: All
Description of the WP4: WP4 is the proof-of-concept field testing WP and takes place over the third year of the project.
The goal is to have a harmonized and standardized poi protocol for identification and characterization of emerging virus threats, which will aid in the overall outbreak preparedness in Europe.

WP4 is divided into 8 tasks:

WP4-T1: Proof-of-concept (SVA, Sweden)

Task start month: M55
Task end month: M60
Task Leader: Lihong Liu, SVA
Deputy Task Leader: Katja Spiess, SSI
Task Participants: SVA
Description of the WP4-T1: WP4-T1 takes place over the third year of the project. The main task of the WP4-T1 is to perform;

1) Proof-of-concept (animal 1, syndrome, Sweden)

WP4-T2: Proof-of-concept (PIWET, Poland)

Task start month: M55
Task end month: M60
Task Leader: Artur Rzeżutka, PIWET
Deputy Task Leader: Katja Spiess, SSI
Task Participants: PIWET
Description of the WP4-T2: WP4-T2 takes place over the third year of the project. The main task of the WP4-T2 is to perform;

1) Proof-of-concept (animal 2, syndrome, Poland)

WP4-T3: Proof-of-concept (ANSES, France)

Task start month: M55
Task end month: M60
Task Leader: Laurent Bigarre, ANSES
Deputy Task Leader: Katja Spiess, SSI

Task Participants: ANSES
Description of the WP4-T3: WP4-T3 takes place over the third year of the project. The main task of the WP4-T3 is to perform;

1) Proof-of-concept (salmonid, cardiopathies, France)

WP4-T4: Proof-of-concept (IZSAM, Italy)
Task start month: M55
Task end month: M60
Task Leader: Alessio Lorusso, IZSAM
Deputy Task Leader: Katja Spiess, SSI
Task Participants: IZSAM
Description of the WP4-T4: WP4-T4 takes place over the third year of the project. The main task of the WP4-T4 is to perform;

1) Proof-of-concept (cattle and equids, vector borne diseases, to be conducted in Africa)

WP4-T5: Proof-of-concept (INIA, Spain)
Task start month: M55
Task end month: M60
Task Leader: Carmina Gallardo, INIA
Deputy Task Leader: Francisco Llorente, INIA
Task Participants: INIA
Description of the WP4-T5: WP4-T5 takes place over the third year of the project. The main task of the WP4-T5 is to perform;

1) Proof-of-concept (animal 5, syndrome, Spain)

WP4-T6: Proof-of-concept (IZSLER, Italy)
Task start month: M55
Task end month: M60
Task Leader: Ana Maria Moreno Martin, IZSLER
Deputy Task Leader: Katja Spiess, SSI
Task Participants: IZSLER
Description of the WP4-T7: WP4-T7 takes place over the third year of the project. The main task of the WP4-T7 is to perform;

1) Proof-of-concept (animal 7, syndrome, Italy)

WP4-T7: Proof-of-concept (NVI, Norway)
Task start month: M55
Task end month: M60
Task Leader: Carlos Goncalo das Neves, NVI
Deputy Task Leader: Katja Spiess, SSI
Task Participants: NVI
Description of the WP4-T8: WP4-T8 takes place over the third year of the project. The main task of the WP4-T8 is to perform;

1) Proof-of-concept (animal 8, syndrome, Norway)

WP4-T9: Proof-of-concept (SSI, Denmark)
Task start month: M55
Task end month: M60
Task Leader: Katja Spiess, SSI
Deputy Task Leader: Jovita Fernandez Pinero, INIA

Task Participants: SSI

Description of the WP4-T9: WP4-T9 takes place over the third year of the project. The main task of the WP4-T9 is to perform;

1) Proof-of-concept (Human , syndrome, Denmark)

Deliverables		
Ref	Title	Due month
D-JRP16-WP1.5	2nd TELE-Vir meeting (Copenhagen, SSI)	M54
D-JRP16-WP1.6	Workshop in the use of the POI-toolbox (Copenhagen, SSI)	M54
D-JRP16-WP4.1	Proof-of-concept performed (animal 1, syndrome 1, Sweden)	M60
D-JRP16-WP4.2	Proof-of-concept performed (animal 2, syndrome 2, Poland)	M60
D-JRP16-WP4.3	Proof-of-concept performed (salmonid, cardiopathies, France)	M60
D-JRP16-WP4.4	Proof-of-concept performed (cattle and equids, vector borne diseases, to be conducted in Africa)	M60
D-JRP16-WP4.5	Proof-of-concept performed (animal 5, syndrome 5, Spain)	M60
D-JRP16-WP4.6	Proof-of-concept performed (animal 6, syndrome 6, Italy)	M60
D-JRP16-WP4.7	Proof-of-concept performed (animal 7, syndrome 7, Norway)	M60
D-JRP16-WP4.8	Proof-of-concept performed (Human, syndrome, Denmark)	M60
D-JRP16-WP1.7	End of project summary report	M60
Milestones		
Ref	Title	Due month
M-JRP16-10	Selection of samples for the proof-of-concept (animal, syndrome, Sweden)	M58
M-JRP16-11	Selection of samples for the proof-of-concept (animal, syndrome, Poland)	M58
M-JRP16-11	Selection of samples for the proof-of-concept (salmonid, cardiopathies, France)	M58
M-JRP16-12	Selection of samples for the proof-of-concept (cattle and equids, vector borne diseases, to be conducted in Africa)	M58
M-JRP16-13	Selection of samples for the proof-of-concept (animal, syndrome, Spain)	M58
		M58
M-JRP16-14	Selection of samples for the proof-of-concept (animal, syndrome, Italy)	M58
M-JRP16-15	Selection of samples for the proof-of-concept (animal, syndrome, Norway)	M58
M-JRP16-16	Selection of samples for the proof-of-concept (Human, syndrome, Denmark)	M58

2.4.1.1.13 JRP17-R2-ET2.2-IDEMBRU

Reference to the Strategic Research Agenda (please refer to D2.7)	**ET 2.2: Development of a toolkit to characterize emerging threats by combining genomic and phenotypic information**									
Research Project Title	**Identification of emerging Brucella species: new threats for human and animals**									
Research Project Acronym	**IDEMBRU**									
Leading Organisation	**P1-ANSES**				Deputy Leading Organisation			**P35-INIAV**		
Project Leader	**Claire Ponsart**				Deputy Project leader			**AC Ferreira**		
Project Start month	**M25**				Project End month			**M54**		
Annual period of the OHEJP the work plan applies: Y5										
Participant	**1**	2	4	**6**	7	8	**9**	**10**	11	12
	Anses	Ages	Sciensano	**NDRVMI**	SZU	VRI	**BfR**	**FLI**	RKI	DTU
PM	**15,00**			**5,50**			**5,80**	**11,65**		
Participant	13	14	15	16	17	18	19	20	**21**	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	PHE
PM									**1,91**	
Participant	23	24	25	26	27	**28**	29	30	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	**IZSAM**	IZSLER	RIVM	**WbvR**	FHI
PM						**5,40**			**3,15**	
Participant	33	34	**35**	**36**	**37**	39	40	41	42	43
	NVI	PIWET	**INIAV**	**INSA**	**IISPV**	SLV	FOHM	SVA	NMVRVI	ISCIII
PM			**6,60**	**11,20**						
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- RNA sequencing protocol for the detection and identification of live *Brucella* sp.
- AMR testing protocol including proposals for ECOFFs for novel emerging *Brucella* sp.
- *In vivo* infection model for emerging and exotic *Brucella* spp.
- Collaborative conception and dissemination of final toolkit;

- Continuous implementation of the data management plan;
- Organisation of the third annual workshop including exchanges between partners and inputs from external stakeholders

Description of work

WP 1-Recording the situation of brucellosis in emergent wild and environmental reservoirs

- WP1 takes place over the first and the second year of the project
- T2 takes place over the first and the second year of the project
- T3 takes place over the second year of the project

WP start month: 37
WP end month: 50
WP Leader: Ana Cristina Ferreira
Deputy WP Leader: Hristo Dalaskov
WP participants : ANSES, APHA, BfR, FLI, INIAV, IZSAM, NDRVMI–BFSA

Description of the WP: The second part of this WP will be dedicated to additional sampling campaigns in different wildlife animals, such as amphibians, bats, cervidae, marine mammals, rodents, suidae. After definition of harmonised protocols for *Brucella* detection (M-JRP19-M7), all collected samples will be tested. Collection of appropriate samples (animal and environmental) will be performed for detection and isolation of emerging *Brucella* and reservoirs by each involved partner. Integrative analysis of collected data will be done in order to develop a flowchart and related tools facilitating investigation and decision-making of emerging *Brucella* outbreaks.

Task **JRP17-WP1-T2**: Sampling and analytical strategy according to previous epidemiological information from the different partners
Task start month: 37
Task end month: 50
Task Leader: Ana Cristina Ferreira
Deputy Task Leader: Hristo Dalaskov
Task Participants: ANSES, BfR, FLI, INIAV, IZSAM, NDRVMI–BFSA

Description of the task: This task is devoted to sampling and analytical protocols. It will enable the creation of new biological collections (serum, samples, and strains) including emerging *Brucella* species and related reservoirs. Selection of countries, regions, targeted animal species and their surrounding environment will be based on practical possibilities related to relevant contexts in terms of natural landscape, livestock demographics, and wildlife populations of each participating country. Sampling and analytical protocols will be harmonized among partners and shared. Collection of appropriate samples (animal and environmental) for detection and isolation of emerging *Brucella* spp. as agreed by the consortium will be performed. All strains will be characterized according to conventional microbiological methods. When available, blood samples will be collected to characterise serological responses using rough and smooth antigens based methods. Each involved partner will collaborate in producing the sampling and the analytical protocols and undertaking collection of biological samples.

Task **JRP17-WP1-T3**: Synthesis and analysis of data
Task start month: 37
Task end month: 50
Task Leader: Ana Cristina Ferreira
Deputy Task Leader: Hristo Dalaskov
Task Participants: ANSES, BfR, FLI, INIAV, IZSAM, NDRVMI–BFSA

Description of the task: Tasks JRP19-WP1-T2 will provide epidemiological and phenotypic data that will be used to complete the database created in JRP19-WP1-T1. Integrative analysis of data will improve knowledge regarding emergent *Brucella* species infections and will be used to define new strategies to detect and monitor emerging infections. This analysis will result in the development of a flowchart and related tools facilitating investigation and decision-making of emerging *Brucella* outbreaks, which will be integrated in the final toolkit (WP6).

Deliverables		
Ref	Title	Due month
D-JRP17-WP1.Del2	Creation of animal and environmental samples collections (serum, tissues, strains, soil, water…) of emerging *Brucella* species and related reservoirs	50
D-JRP17-WP1.Del3	Development of a flowchart and related tools facilitating investigation and decision-making of emerging *Brucella* outbreaks	50
Milestones		
Ref	Title	Due month
M-JRP17-M29	Integrative analysis of the infection situation in the emerging reservoirs	50

WP2 - Recording the situation of brucellosis in human

- WP2 takes place over the first and the second of the project
- T2 takes place over the first and second year of the project
- T3 takes place over the second year of the project

WP start month: 37
WP end month: 50
WP Leader: Ana Pelerito
Deputy WP Leader: Sascha Al Dahouk
WP participants: ANSES, BfR, INSA

Description of the WP: In the second year of WP2, additional sampling design will be continued according to selected emerging reservoirs and characterisation of metadata. The analysis of data should allow the identification of geographic distribution, contributing to the better understanding of emerging brucellosis epidemiology. By the end of the work package, the newly collected *Brucella* strains and serums will be shared among partners for further investigations in WPs 3 to 5. Both leading organisations (INSA and BfR) will ensure coordination, implementation of the surveillance network for human brucellosis and harmonisation of protocols applied in this work package. Partners will contribute through collection of appropriate samples, dissemination of the questionnaire and / or through existing strain collections of emerging *Brucella* and reservoirs. All strains will be characterized according direct methods (microbiological methods and molecular biology).

Task **JRP17-WP2-T2**: Sampling and analytical strategy according to epidemiological information from the surveillance network
Task start month: 37
Task end month: 50
Task Leader: Ana Pelerito
Deputy Task Leader: Sascha Al Dahouk
Task Participants: ANSES, BfR, INSA
Description of the task: This task is devoted to sampling and analytical protocols. It will enable the creation of human biological collections (serum, samples, and strains) including emerging *Brucella*

species and related reservoirs. In order to establish a "One Health" approach, the selection of countries and regions will be based on information derived from WP1, responses to the epidemiological questionnaire, practical possibilities and ethical constraints. Blood samples will be collected by INSA from potentially exposed people for serological testing and direct diagnosis. Methods for blood culture and molecular protocols will be standardised and shared among partners. ANSES and BfR have expertise in isolation and molecular detection of this agent and INSA routinely uses all these techniques.

Task **JRP17-WP2-T3**: Analysis of data and constitutions of biobank
Task start month: 43
Task end month: 50
Task Leader: Ana Pelerito
Deputy Task Leader: Sascha Al Dahouk
Task Participants: ANSES, BfR, INSA

Description of the task: In this task, collected sera and isolated emerging *Brucella* species will contribute to extend existing biobanks including metadata derived from the questionnaire. The analysis of infection situations will improve knowledge on emerging *Brucella* and reservoirs. This will be used to select the most relevant strains for further characterization in WPs 3 to 5. Moreover, integrative analysis of genomic and epidemiological data collected in WP1 and WP2 will be combined using "One Health" approach in order to develop the final toolkit. Additionally, isolates of bacterial species for which emerging *Brucella* sp. isolates have previously been frequently mis-identified by culture methods (see JRP19-WP2-T1) will be collected for detailed phenotypic and genetic characterisation.

Deliverables		
Ref	Title	Due month
D-JRP17-WP2.Del2	Creation of human samples collections (serum, samples, strains) of emerging *Brucella* species and related environments	50
D-JRP17-WP2.Del3	Development of a biobank and tools facilitating investigation and decision-making of emerging *Brucella* outbreaks	50
Milestones		
Ref	Title	Due month
M-JRP17-M30	Integrative analysis of the infection situation in the emerging reservoirs	50

WP3 - Genomic characterisation of *Brucella* detected from samples and selected isolates

- WP3 takes place over the first and the second year of the project
- T1 takes place over the first and the second year of the project
- T3 takes place over the first and the second year of the project
- T4 takes place over the second year of the project

WP start month: 37
WP end month: 54
WP Leader: Roland Ashford
Deputy WP Leader: Giuliano Garofolo
WP participants: ANSES, APHA, BfR, FLI, INIAV, INSA, IZSAM, WBVR

Description of the WP: The objectives of the second year are (i) to apply molecular typing data to the epidemiological investigation of emerging and atypical *Brucella* spp. strains (JRP19-WP3-T1); (ii) to ensure that existing molecular typing schemes remain applicable to the full diversity of the genus, and to develop discriminatory typing assay(s) to identify emerging and atypical *Brucella* spp. strains

(JRP19-WP3-T3). Genotyping data will be combined with existing metadata from samples and isolates to perform epidemiological analyses of atypical and emerging *Brucella* spp. isolates (JRP19-WP3-T4).

Task **JRP17-WP3-T1**: Optimisation of methods for generating molecular typing data from complex samples
Task start month: 37
Task end month: 52
Task Leader: Roland Ashford
Deputy Task Leader: Giuliano Garofolo
Task Participants: ANSES, APHA, BfR, FLI, INIAV, INSA, IZSAM, WBVR

Description of the task: Optimal protocols will be applied amongst other partner institutes (ANSES, BfR, FLI, INIAV, INSA, WBVR) to relevant sample sets generated under WPs 1 & 2. This will enable us to apply existing molecular typing methods (e.g. qPCR, HRM, MLVA, and MLST) to samples directly, without the need to isolate organisms. Identification of clinical and environmental samples of most relevance will be informed by WP 1 (JRP19-WP1-T1) & WP2 (JRP19-WP2-T1). The diagnostic sample collection will additionally be tested using discriminatory single nucleotide polymorphisms (SNPs) retrieved from the whole genome sequencing datasets (JRP19-WP3-T3). Initial work under JRP19-WP3-T1 will primarily be undertaken by the WP3 Lead institute (APHA), with input from Deputy WP Lead institute (IZSAM).

Task **JRP17-WP3-T3**: Identification of emerging *Brucella* species: adaptation of molecular tools
Task start month: 37
Task end month: 52
Task Leader: Roland Ashford
Deputy Task Leader: Giuliano Garofolo
Task Participants: ANSES, APHA, BfR, FLI, INIAV, INSA, IZSAM, WBVR

Description of the task: Molecular typing methods such as multiple locus VNTR analysis (MLVA), multi-locus sequence typing (MLST) and specific gene sequencing (e.g. 16S) are widely applied to molecular typing of *Brucella*. We will apply whole genome sequencing using next generation sequencing platform to the emerging *Brucella* collection obtained from the activities related to WP1 and WP2. We will continue to generate *in silico* 9 & 21 locus MLST, core genome (cg)MLST and whole genome SNP typing data; *in silico* 16-locus MLVA profiles, supported by conventional fragment analysis approaches where necessary. Using expanded genomic databases (incorporating data generated under this project) we will identify discriminatory SNP typing assay(s) to identify atypical *Brucella* spp. strains. The WP3 lead institute (APHA) with input from Deputy WP Lead institute (IZSAM) will lead JRP19-WP3-T3.

Task **JRP17-WP3-T4**: Integrative analysis of genomic and epidemiological data collected in WP1 and WP2
Task start month: 47
Task end month: 54
Task Leader: Roland Ashford
Deputy Task Leader: Giuliano Garofolo
Task Participants: ANSES, APHA, BfR, FLI, INIAV, INSA, IZSAM, WBVR
Description of the task[ii]: Genomic analyses of atypical *Brucella spp*. isolates have focused primarily on their phylogenetic placement relative to other emerging and classical *Brucella* species. We will combine data for isolates generated under work packages WP1 and 2, in order to undertake epidemiological analyses of atypical and emerging *Brucella* spp. isolates in Europe across different emerging reservoirs. Outputs of this combined analysis will be integrated into the final toolkit (WP6).

Deliverables		
Ref	Title	Due month
D-JRP17-WP2.Del3	Molecular typing data from emerging *Brucella* isolates	52
D-JRP17-WP2.Del4	Rapid detection assay(s) for atypical strains using clade specific markers	52
Milestones		
Ref	Title	Due month
M-JRP17-M34	Develop and apply PCRs on high resolving SNPS to DNA extracted from relevant samples	52
M-JRP17-M35	Complete molecular typing of emerging *Brucella* isolates	52
M-JRP17-M38	Epidemiological analysis of emerging *Brucella* isolates	54

WP4 - Phenotypic characterisation of *Brucella* detected from samples and selected isolates

- WP4 takes place over the first, the second and the third year of the project
- T2 takes place over the second and the third year of the project
- T3 takes place over the first, the second and the third year of the project
- T4 takes place over the third year of the project

WP start month: 37
WP end month: 60
WP Leader: Falk Melzer
Deputy WP Leader: Sascha Al Dahouk
WP participants: ANSES, APHA, BfR, FLI, IZSAM, INIAV,INSA

Description of the WP: The major aim of WP4 is to identify diagnostically relevant features to characterize and differentiate novel emerging *Brucella* spp. from the classical species. This includes conventional phenotyping procedures as well as commercial biotyping. We will test and adapt existing AMR protocols in this project to comparatively analyse antibiotic resistance in the novel emerging strains of *Brucella*. The differences in metabolic activity between classical and emerging species shall be characterized using a combined RNASeq and peptidomic (mass spectrometry) approach after inactivation of the living agent. We will also analyse whether the detection of RNA in clinical samples which has a higher abundance is more sensitive than the detection of genomic *Brucella* DNA. For this purpose, the efficacy of RNASeq and 16S metagenomics for the detection of *Brucella* in clinical samples will be compared.

Task **JRP17-WP4-T1**: Phenotyping of novel emerging *Brucella* spp.
Task start month: 37
Task end month: 54
Task Leader: Falk Melzer
Deputy Task Leader: Sascha Al Dahouk
Task Participants: ANSES, APHA, FLI, BfR, IZSAM, INIAV, INSA

Description of the task:
JRP17-WP4-T1-ST1: Emerging *Brucella* species that have been recently described or that are isolated in the context of this proposal (WP1; WP2) will be phenotyped using all appropriate conventional methods under biosafety level 3 conditions. Phenotypic results from partners will be used for overall characterization. Lab work will start after the arrival of the first isolates at FLI.
JRP17-WP4-T1-ST3: Previous studies have shown that the atypical *Brucella species B. microti* exhibits expanded metabolic activities, clearly distinguishable to those of classical *Brucella* species like *B.*

abortus and *B. melitensis*. The Micronaut™ test developed by BfR provides valuable information about the presence of distinct substrate utilizing enzymes and will contribute not only to the functional characterization of the emerging *Brucella* species but also to their discrimination and classification into biovars/subspecies. Therefore, we will analyze *B. microti* and other emerging *Brucella* species that have been recently described or will be isolated from wildlife in the context of this proposal (WP1; WP2) with this assay. In the context of this proposal, we will analyse with this assay *B. microti* and other emerging *Brucella* species that have been and will be isolated from wildlife (WP1; WP2).

Task **JRP17-WP4-T2**: Antimicrobial resistance testing of emerging *Brucella spp.*
Task start month: 43
Task end month: 56
Task Leader: Falk Melzer
Deputy Task Leader: Sascha Al Dahouk
Task Participants: ANSES, APHA, BfR, FLI, IZSAM, INIAV,INSA

Description of the task :
JRP17-WP4-T2-ST2**:** Analysis of AMR results and determination of ECOFFs will be completed and results will be made available to all WP members.

Task **JRP17-WP4-T3**: RNA sequencing of a representative panel of classical and novel *Brucella spp.*
Task start month: 37
Task end month: 60
Task Leader: Sascha Al Dahouk
Deputy Task Leader : Dirk Hofreuter
Task Participants: ANSES, APHA, BfR, FLI, IZSAM, INIAV,INSA

Description of the task :
JRP17-WP4-T3-ST4**:** Potential pathways identified by RNA-Seq, Micronaut and MALDI-TOF to be specifically active in the emerging *Brucella* species will be examined for unique features that can be used as diagnostically relevant markers.

Task **JRP17-WP4-T4**: Translational aspects of RNA-Seq for brucellosis diagnostics in humans
Task start month: 53
Task end month: 59
Task Leader: Sascha Al Dahouk
Deputy Task Leader : Dirk Hofreuter
Task Participants: ANSES, APHA, BfR, FLI, IZSAM, INIAV,INSA

Description of the task :
JRP17-WP4-T4-ST1**:** NGS-based metagenomics and 16S sequencing analyses have gained increasing importance for the detection of bacterial pathogens in humans, livestock and wildlife. Since RNA-Seq detects the multi-copy transcripts of certain genes, this method might be more sensitive than the identification of single copy genes by DNA sequencing. So, we will compare the established RNA- and DNA-based sequencing methods for their sensitivity to identify atypical *Brucella sp.* in tissues and blood of wildlife with brucellosis. Thus, blood and milk samples will be spiked with emerging brucellae to examine the performance of different RNA isolation kits with these matrices. Since *Brucella* is an intracellular pathogen, the RNA isolation method must also be optimized for *Brucella* residing in macrophages.

Deliverables		
Ref	Title	Due month

D-JRP17-WP1.4 Del1	Phenotyping scheme to differentiate emerging *Brucella* sp. from classical species	54
D-JRP17-WP1.4 Del2	AMR testing protocol including proposals for ECOFFs for emerging *Brucella* sp.	56
D-JRP17-WP1.4 Del3	RNA sequencing protocol for the detection and identification of live *Brucella* sp.	60
D-JRP17-WP1.4 Del4	Identification of diagnostically relevant regulatory processes	59
Milestones		
Ref	Title	Due month
M-JRP17-M39	Biotyping of emerging *Brucella* sp. isolated within the project	54
M-JRP17-M40	Electron microscopy of selected isolates/strains	50
M-JRP17-M41	Phenotyping of emerging *Brucella* sp. isolated during the project using the BfR *Brucella* MICRONAUT™	52
M-JRP17-M42	Antibiotic resistance of emerging *Brucella* spp. isolated during the project	52
M-JRP17-M43	RNA sequences of a representative panel of classical and emerging *Brucella* sp.	52
M-JRP17-M44	Comparison of RNA sequences of selected clinical samples with 16S metagenomics to test viability of *Brucella* sp.	52
M-JRP17-M47	Comparison of antibiotic resistance patterns and ECOFFs determination of emerging and classical *Brucella* species	50
M-JRP17-M56	Integration of emerging *Brucella* MALDI ToF MS spectra in the existing peptide profile databases	54
M-JRP17-M57	Identification of diagnostically relevant regulatory processes by biofinformatics analysis of metabolic data (BfR *Brucella* MICRONAUT™) and RNASeq data	54

WP5 - Zoonotic potential and virulence

- WP5 takes place over the first, the second and the third year of the project
- T3 takes place over the second and the third year of the project

WP start month: 49
WP end month: 60
WP Leader: Marielle van den Esker
Deputy WP Leader: Luca Freddi
WP participants: ANSES, APHA, BfR, IZSAM, WBVR

Description of the WP: Understanding the zoonotic potential and virulence of a pathogen is necessary to assess risk to the public and for the development of appropriate preventive measures. The most reliable approach is the collection of historical and epidemiological data, but unfortunately cannot be applied to an emerging disease. Several laboratory animal species, cell lines of human and animal origin, in combination with genomics have been used to understand *Brucella* pathogenesis. However, with the exception of *B. microti*, the virulence of these emerging *Brucella* strains has not been investigated. Hereby we propose to develop a pipeline for evaluation of virulence and zoonotic potential mediated by *in vitro* and *in vivo* infection models. WBVR and ANSES will be executive parties for the WP5. Collaboration between ANSES, APHA, BfR, FLI, IZSAM and WBVR will allow to the harmonisation of *in vitro* and *in vivo* protocols and provide access to all necessary facilities for successful development, execution and benchmarking of the proposed above pipeline. All involved partners will provide selected emerging *Brucella* strains from their own strain bank.

Task **JRP17-WP5-T2**: Develop an *in vitro* protocol to investigate zoonotic potential based on macrophage cell lines originated from human and animals.
Task start month: 41
Task end month: 54
Task Leader: Marielle van den Esker
Deputy Task Leader: Luca Freddi
Task Participants: ANSES, APHA, BfR, IZSAM, WBVR

Description of the task: A panel of classical and emerging *Brucella* species will be selected according to their zoonotic potential based on historical, genomic and phenotypic data. As the next step an *in vitro* infection model based on macrophage cell lines derived from human and animals will be developed. The *in vitro* models will be used for comparison of a target isolate with reference panel of *Brucella* species. For analytical analysis of cell-pathogen interactions, a list of representative virulence genes based on published research will be created and their expression in the course of infection will be quantified by RT-qPCR. In addition, cytokines secreted by the host cell lines will be analysed using specific ELISA kits. WBVR will develop and test *Brucella in vitro* infection protocol, to assess *Brucella spp.* infectivity, cell toxicity and ability for intracellular replication. Moreover, WBVR will perform RT-qPCR quantification of virulence genes expression in the course of infection. ANSES will continue to identify representative virulence genes, design qPCR primers, analyse cytokines secretion by ELISA kits. Finally, IZSAM will support investigation of virulence factors expression

Task **JRP17-WP5-T3**: *In vivo* testing of *Brucella* isolates with high zoonotic potential.
Task start month: 45
Task end month: 54
Task Leader: Marielle van den Esker
Deputy Task Leader: Luca Freddi
Task Participants: ANSES, WBVR

Description of the task: Experimental *in vivo* infection of guinea pigs (*Cavia porcellus*) as a test subjects will be performed with the objective of investigating the virulence of emerging *Brucella* stains. In agreement with both other partners, final panel of emerging *Brucella* species will be selected according to their *in vitro* (JRP17-WP5-T2) pathogenic potential, historical, genomic (JRP17-WP5-T1) and phenotypic data. Using ANSES BSL3 graded vivarium *in vivo* infection of experimental animals will be conducted. In the course of *in vivo* experiment major aspects of pathogenesis, such as, minimal infection dose, routes of infection, infective agent tropism, host morbidity and immune response will be investigated. All partners will design the animal experiment and select a panel of *Brucella* strains suitable for *in vivo* investigation. Finally, ANSES will conduct of the animal experiment and will investigate host immune response of infected animals.

Deliverables

Ref	Title	Due month
D-JRP17-WP5.Del2	Development of a reliable macrophage based *in vitro* system for rapid assessment of zoonotic potential	54
D-JRP17-WP5.Del3	*In vivo* infection model for emerging *Brucella* spp.	54
D-JRP17-WP5.Del4	Development of a decision-tree as a tool to support decision-making concerning zoonotic potential of *Brucella species*	54

Milestones

Ref	Title	Due month
M-JRP17-M31	Experimental determination of infection gates	50
M-JRP17-M36	Harmonization of analytical methods for investigation of pathogen – host-cell cross talk.	52

M-JRP17-M45	Formulation of *in vitro* infection parameters that will reflect zoonotic potential of a *Brucella* isolate.	54
M-JRP17-M48	Harmonize *in silico*, *in vitro* and *in vivo* results	50
M-JRP17-M53	Description of infection pathodynamic using molecular and histological approaches in experimental animals	52
M-JRP17-M54	Finalize and benchmark the decision tree	52

WP6 - Development of a toolkit for emerging brucellosis infections

- WP6 takes place over the second and the third year of the project
- T2 takes place over the second and the third year

WP start month: 43
WP end month: 60
WP Leader: Fabrizio de Massis
Deputy WP Leader: Adrian Whatmore
WP participants: All the partners

Description of the WP: The toolkit will aim to improve accessibility to credible and up-to-date information on brucellosis and emerging *Brucella* threats of public health significance in a format that is quick and easy to use, all in one location. The task will take all the necessary information coming from all the IDEMBRU WPs and will make use of the deliverables obtained during the project.
Results from the all the WPs of IDEMBRU will be analysed together in order to develop a toolkit for the evaluation of brucellosis and *Brucella* strains in a public health context. The information available will be incorporated into the toolkit for the ease of use by public health institutes, veterinary agencies and other stakeholders.

Task **JRP17-WP6-T1**: Review of toolkit for infectious diseases
Task start month: 43
Task end month: 50
Task Leader: Fabrizio De Massis
Deputy Task Leader: Adrian Whatmore
Task Participants: All the partners

Description of the task: During the task, a comprehensive review of toolkits published by different organizations and agencies will be undertaken. The research will be made through internet based resources and through direct contact with ECDC and EFSA in order to take advantage of previous studies. Work under Task JRP19-WP6-T1 will primarily be undertaken by the WP6 Lead institute (IZSAM), with input from Deputy WP Lead institute (APHA). The other partner institutes (ANSES, BfR, FLI, INIAV, INSA, WBVR), will provide critical inputs and contribute to the review from their national perspectives.

Task **JRP17-WP6-T2**: Development of *Brucella* toolkit
Task start month: 51
Task end month: 60
Task Leader: Fabrizio De Massis
Deputy Task Leader: Adrian Whatmore
Task Participants: All the partners

Description of the task: Results from genomic characterization, phenotypic tests and *in vitro* studies of the emerging *Brucella* will be summarized and integrated prior the development of the toolkit. The goal of this toolkit is to improve accessibility to credible and up-to-date information on emerging brucellosis of public health significance in a format that is quick and easy to use. The task will take all

the necessary information coming from all the IDEMBRU WPs and will make use of the deliverables obtained during the project. The information available from each WP will include reporting requirements, epidemiology, risk factors, diagnosis and testing, treatment and case management and additional resources with links attached. The document will also report the advanced testing algorithms for the analyses of whole genome sequencing and whole proteome for interpretation and classification of the emerging *Brucella* strains. The toolkit will also comprise the harmonised procedure for isolation and identification of emerging *Brucella* with a detailed guidance for interpretation of results, moreover it will report a complete list of experts and laboratory for seeking diagnostic assistance.

Deliverables

Ref	Title	Due month
D-JRP17-WP6.Del1	Review of toolkits for infectious diseases	50
D-JRP17-WP6.Del2	Collaborative toolkit for emerging *Brucella* species and related reservoirs	54

Milestones

Ref	Title	Due month
M-JRP17-M27	List of toolkits available from previous experience	49
M-JRP17-M28	Literature reviewing	49
M-JRP17-M49	Testing algorithms for WGS and proteome	50
M-JRP17-M50	Harmonised procedures from IDEMBRU WPs	50
M-JRP17-M51	Availability of reference database	50

WP7 - Coordination, management and communication

- WP7 takes place over the first, the second and the third year of the project
- T1 takes place over the first, the second and the third year of the project
- T2 takes place over the first, the second and the third year of the project
- T3 takes place over the first, the second and the third year of the project
- T4 takes place over the first, the second and the third year of the project

WP start month: 37
WP end month: 60
WP Leader: Claire Ponsart
Deputy WP Leader: Ana Cristina Ferreira
WP participants: All the partners

Description of the WP: This work package is dedicated to the general coordination and management of the project including all administrative and financial issues. This will ensure the timely implementation of the tasks, the smooth running of the project and successful dissemination of outputs. Specific tasks will be dedicated to data and risk management. Three workshops will be used for coordination of work, exchanges of information and collaborative development of the toolkit. The coordinator will ensure successful management, integration and delivery of the project, and will coordinate and provide effective reporting and communications between project partners. A steering committee composed of one representative for each participating institute will be set up to discuss the advancement of the project through progress reports. The WP leaders report on their respective WP, whereas the coordinator is responsible for the final report.

Task **JRP17-WP7-T1**: Coordination and organisation
Task start month: 37
Task end month: 60

Task Leader: Claire Ponsart
Deputy Task Leader: Ana Cristina Ferreira
Task Participants: All the partners

Description of the task: WP leaders assisted by Deputy WP leaders will be in charge of coordination and management inside WPs and of the preparation of activity reports to be compiled by the project coordinator. According to results obtained during the second year, adjustments in the work-plan will be discussed within the steering committee. Regular exchanges within the steering committee will be organised by video- or telephone conferences. IZSAM will organize the final workshop, including collaborative work to complete the creation of final toolkit. The final workshop will regroup all project participants as well as external stakeholders.

Task **JRP17-WP7-T2**: Data management
Task start month: 37
Task end month: 60
Task Leader: Guillaume Girault
Deputy Task Leader: Ana Pelerito
Task Participants: All the partners

Description of the task: Data generated during the second year will be listed and stored in the shared common platform. Finally, during the third year, all data generated during the project will be verified and made available for all scientific community and European network.

Task **JRP17-WP7-T3**: Risk management
Task start month: 37
Task end month: 60
Task Leader: Claire Ponsart
Deputy Task Leader: Ana Cristina Ferreira
Task Participants: All the partners

Description of the task: Changes necessary in order to deliver milestones on time as well as delays and problems in achieving the milestones will be reported in advance of workshops by work package leaders and deputy leaders. Modifications to the project made possible by newly available materials and techniques will be discussed, evaluated and, if considered appropriate, implemented in a coordinated manner, as will possible changes in emphasis based on developments in perceived threats and newly published work appearing in the literature.

Task **JRP17-WP7-T4**: Synthesis and dissemination of recommendations coming from the project outputs
Task start month: 37
Task end month: 60
Task Leader: Claire Ponsart
Deputy Task Leader: Ana Cristina Ferreira
Task Participants: All the partners

Description of the task: The second and last results will be disseminated through existing networks, such as the EU reference laboratories network (coordinated by ANSES) and the European institutions (DG Sante, ECDC and EFSA). The main components of the toolkit will be made available as open resources on an European website together with standard operating procedures, scientific papers and conference contributions.

Deliverables

Ref	Title	Due month
D-JRP17-WP7.Del5	Report of the 2nd annual workshop including exchanges between partners and inputs from external stakeholders	52
D-JRP17-WP7.Del6	Report of the last annual workshop including exchanges between partners and inputs from external stakeholders	54
D-JRP17-WP7.Del7	Implementation of a notification system including emerging and non-regulated *Brucella*	54
Milestones		
Ref	Title	Due month
M-JRP17-M32	Implementation of 2nd annual workshop	50
M-JRP17-M33	Mailing list of people / institutes receiving notifications	50
M-JRP17-M37	Conference call of the steering committee regrouping WP leaders and deputy leaders	53
M-JRP17-M46	Definition of the programme of the annual workshop	49
M-JRP17-M52	Organisation of accommodation and logistic aspects	51
M-JRP17-M55	Implementation of 3rd annual workshop	53

2.4.1.1.14JRP18-R2-ET1.1-MEmE

Reference to the Strategic Research Agenda (please refer to D2.7)	**ET 1.1: Development and harmonization of NGS and non-NGS methods (e.g. pheno-genotypic and histochemical methods) for the detection of foodborne parasites**		
Research Project Title	**Multi-centre study on *Echinococcus multilocularis* and *Echinococcus granulosus s.l.* in Europe: development and harmonization of diagnostic methods in the food chain.**		
Research Project Acronym	**MEmE**		
Leading Organisation	**P27-ISS**	Deputy Leading Organisation	**N/A**
Project Leader	**Adriano Casulli**	Deputy Project leader	**N/A**
Project Start month	**M25**	Project End month	**M60**

Annual period of the OHEJP the work plan applies: Y5

Participant	**1**	2	4	6	7	8	9	**10**	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	**FLI**	RKI	DTU
PM	**14,50**							**4,50**		
Participant	**13**	**14**	**15**	16	17	18	19	20	21	22
	SSI	**UT**	**VFL**	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM	**14,50**	**2,30**	**0,70**							
Participant	23	24	25	26	**27**	28	29	**30**	31	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	IZSAM	IZSLER	**RIVM**	WbvR	FHI
PM					**27,60**			**1,33**		
Participant	**33**	**34**	**35**	**36**	37	39	40	**41**	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**1,80**	**3,01**	**2,01**	**3,50**				**3,40**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Ending the development and validation of **NEW TOOLS**: Ending the assessment of selected newly developed molecular methods against the existing techniques (WP3,T5).
- Ending the development and validation of **NEW TOOLS**: biomarker discovery in exosomes from sheep plasma for diagnosis of CE infection (WP3,T4). Ending the molecular epidemiology studies on Eg genotype diversity (WP3-T9).
- Ending the **PROFICINECY TESTING SCHEMES** organized by the MEmE network to consolidate and improve laboratory skills in the parasitological and molecular procedures (WP4,T3).
- **DISSEMINATING PROJECT RESULTS** at different levels (general public, populations at risk, biologists, veterinarians, clinicians, health authorities, policy makers and media) (WP4,T2).

Description of work

WP: **1 (SAMPLIG STRATEGY)** (takes place over the 3rd, 4th and 5th year)

WP start month: **25**; WP end month: **54**; WP Leader: **PIWET**

WP participants: ISS, FLI, ANSES, RIVM, PIWET, SVA, NVI, SSI, INIAV, INSA, VFL, CVRL, BIOR, CMRIXJ, JLU, VRIXJ

Description of the WP: This WP is aiming to **collect (in the field/research facilities) and produce in the laboratory, the biological material** needed to implement the activities of MEmE. Samples will be used for validation of parasitological/molecular methods (WP2), to generate innovative tools and epidemiological data (WP3), and prepare Proficiency Testing Schemes (WP4).

WP1	M25-26	M27-28	M29-30	M31-32	M33-34	M35-36	M37-38	M39-40	M41-42	M43-44	M45-46	M47-48	M49-50	M51-52	M53-54	M55-56	M57-58	M59-60
T1.																		
T2.																		
T3.															D1.3			

Task: **JRP-WP1-T3. Matrices collection from experimental fox model**
(takes place over the 3rd and 4h year)

Deliverables		
Ref	Title	Due mo
D-JRP18-WP1.3	Collection of samples from experimental animal model finalized	M54

Milestones		
Ref	Title	Due mo
M-JRP18-15	Interim evaluation of collection of samples from experimental animal model	M48

WP: **2 (VALIDATION of PARASITOLOGICAL and MOLECULAR ASSAYS)**
(takes place over the 3rd and 4th year)

WP start month: **29**; WP end month: **54**; WP Leader: **ANSES**

WP participants: ISS, FLI, ANSES, RIVM, PIWET, SVA, NVI, SSI, INIAV, UT, VFL, CVRL, BIOR

Description of the WP: This WP will focus on the **harmonization and validation of selected parasitological and molecular procedures**. Validation will include estimates of the analytical and diagnostic performance characteristics of tests. This research will be conducted in line with OIE principles and methods of validation of diagnostic assays for infectious diseases. Development and validation of analytical methods will be performed, where possible, in a quality system according to **UNI CEI EN ISO/IEC 17025:2005** (*General requirements for the competence of testing and calibration laboratories*). In the absence of an acceptable gold standard, the performance of the diagnostic tests will be assessed by means of **Bayesian modelling** (Branscum et al., 2005).

WP2	M25-26	M27-28	M29-30	M31-32	M33-34	M35-36	M37-38	M39-40	M41-42	M43-44	M45-46	M47-48	M49-50	M51-52	M53-54	M55-56	M57-58	M59-60

T1.																		
T2.																		
T3.															D2.3			

Task: **JRP-WP2-T1. Segmental Sedimentation and Counting Technique, SSCT**
(takes place over the 3rd and 4th year)

Task: **JRP-WP2-T2. Comparison of multiplex PCRs**
(takes place over the 3rd and 4th year)

Task: **JRP-WP2-T3. Magnetic Capture - Real Time PCR assay**
(takes place over the 3rd, 4th and 5th year)

Deliverables		
Ref	Title	Due month
D-JRP18-WP2.3	Validation of Magnetic Capture - Real Time PCR assay	M54
Milestones		
Ref	Title	Due month

WP: **3 (DEVELOPMENT/VALIDATION of NEW TOOLS and PRODUCTION of DATA RELEVANT for EPIDEMIOLOGICAL ASSESSMENTS)**
(takes place over the 3rd, 4th and 5th year)
WP start month: **27**; WP end month: **60**; WP Leader: **FLI**
WP participants: ISS, FLI, ANSES, PIWET, SVA, NVI, SSI, INIAV, INSA, UT, BIOR, CMRIXJ, JLU, VRIXJ, IPZ, UH, LURJ, TH
Description of the WP: This WP is aiming to **generate new innovative tools** for rapid detection, differential diagnosis, and tracking of infection, both at large and small-scale settings. The tools will include:

1) new molecular markers (new mitochondrial and microsatellite markers, and NGS-based method);
2) new multiplex TaqMan qPCR for detection and genotyping of Eg s.l. and Em;
3) new NGS approach instead of the current sequencing methods;

This WP will also collect field samples and data to generate **data relevant for epidemiological assessments** on:

1) contamination of lettuces but also strawberries/blueberries (new subtask) for human consumption by eggs of Em/Eg;
2) prevalence of Em/Eg in dogs;
3) Human source attribution of cerebral CE.

WP3	M25-26	M27-28	M29-30	M31-32	M33-34	M35-36	M37-38	M39-40	M41-42	M43-44	M45-46	M47-48	M49-50	M51-52	M53-54	M55-56	M57-58	M59-60
T1.																	D3.1	
T2.															D3.2			
T3.															D3.3			
T5.															D3.5			
T6.															D3.6			
T7.															D3.7			
T8.															D3.8			

Task: **JRP-WP3-T1. New molecular markers for Em and Eg s.l.: from rapid diagnostics to source attribution**
(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP3-T2. New multiplex TaqMan qPCR for detection and genotyping of Eg s.l. and Em**

(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP3-T3. Detection of Em/Eg in complex samples: sequencing using RSE and NGS**
(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP3-T4.**
Task definitively discontinued by COVID19-pandemic
(takes place over the 3rd, 4th and 5th year)

We encountered serious technical difficulties regarding the proteomic study (at ISS, Italy) from plasma of experimentally infected (and controlled) sheep in Portugal (at INIAV, Portugal). Because of COVID-19, we were late in obtaining ethics committee approval at INIAV. Afterwards, in November 2020 we made 2 attempts with parasite protoscoleces collected from sheep in Sardinia (IZSS, Italy) to infect foxes in Nancy, France (ANSES) where ethics committee approval was also obtained for foxes. Unfortunately, in January 2021 we did not obtain Eg worms from fox experimental model (neither at flotation of faecal samples nor at PCR examination). During February/august 2021 we mobilized the international community to provide Eg eggs from experimentally or naturally infected canids. We received positive feedback from Australia, Iraqi Kurdistan, Kazakhstan and China, willing to collect and subsequently provide eggs. National lockdowns and national restrictions due to COVID-19 affected such field-collaboration since all these participants have retired. These eggs would have been used to infect sheep (animals are still housed in Portugal) and collect plasma for proteomic analyses searching for biomarkers of infection. We also discussed to modify ethical clearance at INIAV and try to infect sheep with Eg protoscoleces, instead of Eg egg. Since intraperitoneal injection of protoscoleces is not mimicking the natural infection, this would affect molecular pathways and therefore proteomic analysis outcome. Even if we found another solution (which is technically impossible), there would be no time to implement it before the end of MEME because of the long time (at least 1 year) it takes for the parasite to develop in sheep. We confirm that COVID19-pandemic has definitively discontinued task 4 of WP3.

Task: **JRP-WP3-T5. Assessment of newly developed molecular methods against the existing techniques**
(takes place over the 4th and 5th year)

Task: **JRP-WP3-T6. Contamination of vegetables for human consumption by Em/Eg**
WP3-T6-ST1 in lettuces. (already present in the workplan)
WP3-T6-ST2 in strawberries and blueberries. (New subtask)
We inserted a new and additional subtask on the detection of *Echinococcus* eggs in different matrices (strawberries and blueberries) by filtration method combined to real-time PCR assay.

Deliverables		
Ref	Title	Due month
D-JRP18-WP3.1	New molecular markers	M58
D-JRP18-WP3.2	New multiplex TaqMan qPCR	M54
D-JRP18-WP3.3	New NGS method for the detection in complex samples	M54
D-JRP18-WP3.5	Assessment of newly developed methods against the existing	M54
D-JRP18-WP3.6	Contamination of vegetables (lettuces and strawberries /blueberries) by Em/Eg	M54
D-JRP18-WP3.7	Prevalence of Em/Eg in dog from selected geographical areas	M54
D-JRP18-WP3.8	Human source attribution of cerebral CE (task replaced)	M54
Milestones		
Ref	Title	Due month
M-JRP18-16	Selection of new/old methods to be compared	M48
M-JRP18-07	Protocols for New molecular methods, NGS included	M54

WP: **4 (TRAINING, DISSEMINATION and PROFICIENCY TESTING SCHEMES)**
(takes place over the 3rd, 4th and 5th year)
WP start month: **27**; WP end month: **60**; WP Leader: **ISS**
WP participants: ISS, FLI, ANSES, RIVM, PIWET, SVA, NVI, SSI, INIAV, INSA, UT, VFL, CVRL, BIOR, CMRIXJ, JLU, VRIXJ, LURJ, TH
Description of the WP: This WP will focus on:
1) establishing the most effective methods for **disseminating project results** at different levels (general public, population at risk, biologists, veterinarians, clinicians, health authorities, policy makers and media);
2) training scientists from institutions participating to MEmE in the parasitological and molecular identification of *Echinococcus* spp. This WP will also focus on the dissemination and training within **International Networks** linked to MEmE such as the NRL for Parasites/*Echinococcus* (https://w3.iss.it/site/EURLPMaps/MapsInfo.asp);
3) organization and delivery of PTs for the harmonization and validation of selected parasitological and molecular procedures.

WP4	M25-26	M27-28	M29-30	M31-32	M33-34	M35-36	M37-38	M39-40	M41-42	M43-44	M45-46	M47-48	M49-50	M51-52	M53-54	M55-56	M57-58	M59-60
T1.																	D4.1	
T2.																		D4.3
T3.																	D4.2	

Task: **JRP-WP4-T1. Trainings (parasitological and molecular approaches, NGS included)**
(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP4-T2. Dissemination of project results**
(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP4-T3. Organization of selected PTs from WP2 and WP3**
(takes place over the 4th and 5th year)

Deliverables		
Ref	Title	Due month
D-JRP18-WP4.1	Analysis and evaluation of training activities	M58
D-JRP18-WP4.2	Analysis and evaluation of PTs	M58
D-JRP18-WP4.3	Report on dissemination activities	M60
Milestones		
Ref	Title	Due month
M-JRP18-19	Diagnostic performance of Participants to PTs	M54
M-JRP18-20	Analysis and evaluation of dissemination activities	M58

WP: **5 (SCIENTIFIC and ADMINISTRATIVE MANAGEMENT)**
(takes place over the 3rd, 4th and 5th year)
WP start month: **25**; WP end month: **60**; WP Leader: **ISS**
WP participants: ISS, FLI, ANSES, RIVM, PIWET, SVA, NVI, SSI, INIAV, INSA, UT, VFL, CVRL, BIOR, CMRIXJ, JLU, VRIXJ, IPZ, UH, LURJ, TH
Description of the WP: **This WP will focus on the scientific and administrative coordination, which** are foreseen in the project work plan to ensure efficient and successful cooperation between the project partners. This requires the setting up of effective decision-making bodies, clear external communication and operational internal communication, and effective administrative and technical control. As such, **coordination** will be based on the following major principles: **1)** effective quality

management; **2)** compliance with all relevant EC regulations and implementation of sound monitoring and professional administration to prevent time and cost escalation; **3)** strong research commitment from the entire team to enable efficient execution of activities, timely delivery of results and horizontal data dissemination across the Consortium and stakeholders to ensure the exploitation of the results; **4)** flexible and responsive management to accommodate the need for changes as the Consortium advances its scientific agenda; **5)** identification, protection and management of the Intellectual Property Rights (IPR) generated by the project; **6)** management of ethical issues. This WP will ensure also the good management of the research data through the development of a **Data Management Plan** (DMP).

WP5	M25-26	M27-28	M29-30	M31-32	M33-34	M35-36	M37-38	M39-40	M41-42	M43-44	M45-46	M47-48	M49-50	M51-52	M53-54	M55-56	M57-58	M59-60
T1.																		
T2.													D5.6					D5.4 D5.7
T3.																		

Task: **JRP-WP5-T2. Administrative and scientific management**
(takes place over the 3rd, 4th and 5th year)

Task: **JRP-WP5-T3. Ethics management**
(takes place over the 3rd, 4th and 5th year)

Deliverables

Ref	Title	Due month
D-JRP18-WP5.6	Interim annual meeting in Greifswald (Germany) by FLI	M49
D-JRP18-WP5.4	Periodic technical and financial reports to EJP/Commission	M60
D-JRP18-WP5.7	Final meeting in Rome (Italy) by ISS	M59

Milestones

Ref	Title	Due month
M-JRP18-21	Organization of Final meeting by ISS	M56
M-JRP18-22	Preparation of technical and financial reports to EJP/Commission	M58

2.4.1.1.15 JRP19-R2-ET1.1-PARADISE

Reference to the Strategic Research Agenda (please refer to D2.7)	**ET 1.1: Development and harmonization of NGS and non-NGS methods (e.g. pheno-genotypic and histochemical methods) for the detection of foodborne parasites**		
Research Project Title	**PARADISE– PARAsite Detection, ISolation and Evaluation**		
Research Project Acronym	**PARADISE**		
Leading Organisation	**P27-ISS**	Deputy Leading Organisation	**P41-SVA**
Project Leader	**Simone M. Cacciò**	Deputy Project leader	**Karin Troell**
Project Start month	**M25**	Project End month	**M60**
Annual period of the OHEJP the work plan applies: Y5			

Participant	**1**	2	4	6	7	**8**	**9**	10	**11**	12
	Anses	Ages	Sciensano	NDRVMI	SZU	**VRI**	**BfR**	FLI	**RKI**	DTU
PM	**3,26**					**2,20**	**1,50**		3,50	
Participant	**13**	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM	7,00									
Participant	**23**	**24**	25	26	**27**	28	29	**30**	31	32
	UoS	**OKI**	NUIG	TEAGASC	**ISS**	IZSAM	IZSLER	**RIVM**	WbvR	FHI
PM	**2,70**	**1,30**			**9,00**			**1,68**		
Participant	**33**	**34**	**35**	36	37	**39**	**40**	**41**	42	43
	NVI	**PIWET**	**INIAV**	INSA	IISPV	**SLV**	**FOHM**	**SVA**	NMVRVI	ISCIII
PM	**0,82**	**0,20**	**0,96**			**1,15**	**1,00**	**6,20**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- To organize the Final meeting, ensuring financial reporting and timely completion and submission of Deliverables (WP1)
- Testing of the selected markers by a team of expert laboratories for development of MLST schemes for *C. parvum* and *G. duodenalis* (WP3)
- Inter-laboratory comparison of typing schemes (WP3)
- Development of pre-DNA extraction enrichment approach (nanobodies and aptamers) for specific and efficient detection of *C. parvum* and *G. duodenalis* (oo)cysts, including an inter-laboratory comparison (validation) of the newly developed method (WP4)
- Development of post-DNA extraction approaches to enrich target DNA of low abundance in various matrices, including an inter-laboratory comparison of the newly developed method (WP4)

Description of work

The work is organized into 4 work packages (WPs), with specific tasks (T). The 3-year project spans over three Annual Periods (Y3-Y5) and is described in three Work Plans.

WP JRP-PARADISE_WP1 Coordination and impact

WP start month M25; WP end month M60

WP Leader: **Simone M Cacciò, ISS**; WP Deputy: **Karin Troell, SVA**.

WP participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI, BIOR, CRU, HZAU, JLU, NMBU, UoM**

Description of the WP:

- WP1 takes place over the first, the second and the third annual period of the project. WP1 works closely with all the WPs of the project.

WP1 will be responsible for all reporting to the OHEJP coordinating body and will coordinate three annual meetings during the 3-year project. Because of the large number of partners in the consortium, and the need for interaction between WPs, WP1 will play an important role in ensuring that milestones and final deliverables of the consortium are successfully completed and communicated.
The Coordinator at ISS and the Co-coordinator at SVA will collaborate in keeping continuous contact between the WPs and ensure proper dissemination of results.
A PARDAISE Project Management Team (PA-PMT) comprising the Coordinator, Co-coordinator and WP leaders will be established. The project will also have a Steering Committee, with one representative per partner Institute. The Committee will meet during the three annual assemblies planned within PARADISE.
In addition to these, an Advisory Board comprising relevant stakeholders, including a representative from CDC and from EFSA, will be included. Members for the Advisory Board will be recruited at the start of the project. The Board will meet with the coordinators through Skype-meetings, and will be asked for advice on project directions two times in the project period.

Task: JRP-PARADISE-WP1-T1 T-0.1 Management, coordination and communication

Task start month: **M25**; Task end month: **M60**

Task Leader: **Simone M Cacciò**, **ISS**; Deputy Task Leader: **Karin Troell**, **SVA**

Task Participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI, BIOR, CRU, HZAU, JLU, NMBU, UoM**

Description of the task :

- WP1-T1 takes place over the first, second, and third annual period of the project.

This task will include communication to all partners about project progress, upcoming deadlines, follow-up of deliverable completion, and reporting of deliverables to the OHEJP.

Coordination and management of the project. A PARADISE Management Team (PAMT) comprising the Coordinator, Co-coordinator and WP leaders will be established. Throughout the project, the PAMT will have regular teleconferences (at least four times per year or more often, if needed) to communicate across WPs and ensure that the work flow within and between WPs proceeds as expected. A common platform will be set up to facilitate sharing of information and documents. Adherence to H2020 rules regarding e.g. ethics, dissemination and publication will be ensured. The Coordinator at ISS will support all partners in the project with any questions regarding financial or procurement of goods and services.
In the last annual period of the project, a Final Meeting (FM) will be organized by SVA, Sweden, where the consortium participants discuss and integrate all results in view of their dissemination to the scientific community and the public.

WP: JRP-PARADISE_WP2 NGS-based genomics and metagenomics
Task start month: **M25**; Task end month: **M58**
WP Leader: **Yannick Blanchard**, **ANSES**; WP Deputy: **Simone M Cacciò, ISS**
WP Participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI**
Description of the WP:

- WP2 takes place over the first, the second and the third annual period of the project.

WP2 aims at 1) generating novel genome data from selected isolates of *Cryptosporidium parvum* and *Giardia duodenalis* (WP2-T1); 2) using in silico approaches and a referenced database to interrogate available metagenomes to detect foodborne parasites (WP2-T2); and 3) using amplicon-based and shotgun metagenomics approaches to detect target parasites using spiked food matrices (WP2-T3).

Task: **JRP-PARADISE-WP2-T2 *In silico* analyses of metagenomes for detection of foodborne parasites (protozoa and helminths)**
Task start month **M25**; Task end month **M58**
Task Leader: **Frits Franssen, RIVM**; Deputy Task Leader: **Yannick Blanchard, ANSES**.
Task Participants: **RIVM, ISS, SSI, VRI**
Description of the task:

- WP2-T2 takes place over the first, second and third annual period of the project.

This task will continue in Year 5 based on what achieved during the previous two annual periods of the project. The *in silico* detection of foodborne parasites in metagenomes from human and animal gut microbiomes, environmental samples (soil, water, and wastewater/sludge), and food (plant-related), will continue using new metagenome data, which number is likely to increase during the project. This task will also provide information on the relative performance of amplicon-based and shotgun metagenomics after processing of the data generated by WP2-T3.

Task: **JRP-PARADISE-WP2-T3 Experimental amplicon-based and shotgun metagenomics for detection of foodborne parasites**
Task start month **M25**; Task end month **M58**
Task Leader: **Rune C. Stensvold, SSI;** Deputy task Leader: **Petr Kralik, VRI**
Task Participants: **SSI, ISS, RIVM, VRI**
Description of the task:

- WP2-T3 takes place over the first, second and third years of the project

This task will continue in Year 5 based on what achieved during the previous annual periods of the project. The results of metagenomics experiments on spiked food matrices performed at SSI and ISS, and of the corresponding data analysis at RIVM, will be integrated. A SOP describing the complete workflow, from food spiking and processing to metagenomics and data analysis, will be prepared as a common WP2-T2 and WP2-T3 outcome.

Description of work

WP: JRP-PARADISE_WP3 Design, implementation and validation of multi-locus typing schemes

Task start month **M25**; Task end month **M58**

WP Leader: **Karin Troell, SVA**; Deputy WP Leader: **Christian Klotz, RKI**

WP participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI**

Description of the WP :

- WP3 takes place over the first, the second and the third annual period of the project

Based on WGS data already available or generated in WP2, this WP aims to identify new markers suitable for robust genotyping (WP3-T1). The new markers will be tested by expert laboratories and the markers and typing approach will be iteratively developed with WP3-T1 until respective typing protocols are produced (WP3-T2). The protocols will be tested by an inter-laboratory validation (WP3-T3).

Task : JRP-PARADISE-WP3-T2 Development of multi-locus typing schemes for *C. parvum* and *G. duodenalis*

Task start month **M31**; Task end month **M58**

Task Leader: **Martha Betson, UoS**; Deputy Task Leader: **Simone M. Cacciò, ISS**

Task Participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI**

Description of the task:

- WP3-T2 takes place over the first, second and third annual period of the project

In the third annual period of the project, MLST schemes for *C. parvum* and *G. duodenalis* will be finalized through consultation between the four participating laboratories and standardized protocols will be produced for each parasite.

Task : JRP-PARADISE-WP3-T3 Inter-laboratory comparison of typing schemes

Task start month **M43**; Task end month **M58**

Task Leader: **Anne Mayer-Scholl, BfR** ; Deputy Task Leader: **Jeroen Roelfsema, RIVM**

Task Participants: **ANSES, BFR, FOHM, INIAV, ISS, NVI, OKI, PIWET, RIVM, RKI, SLV, SSI, SVA, UoS, VRI**

Description of the task:

- T3.3 takes place only over the second and third annual period of the project

Based on the MLST protocols for each parasite, an inter-laboratory comparison will be organized between all partners to assess their robustness and reproducibility. In year 5, BfR will distribute extracted DNA samples of 8-10 MLST types per pathogen, and reagents needed to perform the tests. These materials will be shipped under controlled conditions. Each participant will complete a questionnaire focusing on technical details and practicability of the method (including equipment used, any variation to the SOPs, hands-on and turnaround times, problems encountered). Results of the laboratory work and questionnaire will be compared statistically and made available in the form of a report.

Description of work

WP : JRP-PARADISE_WP4 Parasite enrichment strategies

WP start month **M25**; WP end month **M58**

WP Leader **Marco Lalle, ISS**; Deputy WP Leader: **Mats Isaksson , SVA**

WP participants **ISS, SVA, RKI, ANSES, VRI, INIAV, FOHM, SLV, SSI, RIVM**

Description of the WP :

- WP4 takes place over the first, the second and the third annual period of the project.

In Y5, WP4 continues based upon what achieved during the previous annual periods of the project. The objectives of WP5 are development and inter-laboratory comparison of : i) two pre-DNA extraction protocols based on new affinity reagents (nanobodies and aptamers) for magnetic capture of *C. parvum* and *G. duodenalis* (oo)cysts in different matrices; ii) a protocol for post-DNA extraction enrichment strategy to fish-out and concentrate parasite DNA based on hybridization of target-specific biotinylated probes.

Task : JRP-PARADISE-PARADISE-WP4-T1 Development of pre-DNA extraction enrichment strategies
Task start month **M25**; Task end month **M58**
Task Leader: **Christian Klotz, RKI**; Deputy Task Leader: **Gregory Karadjian, ANSES**
Task Participants: **RKI, ANSES, ISS, SVA,VRI**

Description of the task :

- WP4-T1 takes place over the first, the second and the third annual period of the project.

The objectives of this task are the development and evaluation of pre-DNA extraction protocols based on two alternative affinity reagents (nanobodies and aptamers), and their application for magnetic capture of *C. parvum* and *G. duodenalis* (oo)cysts in different matrices.
In Y5, WP4-T1 continues based upon what achieved during the previous annual periods of the project. A pilot panel of oocyst-spiked samples (e.g. faeces, fresh produce, and water) will be prepared at RKI (or ANSES) and send to task participants for a comparative evaluation of the nanobodies- and aptamer-based assays. The performance parameters will be compared to those of the available ISO standard for detection of *Cryptosporidium* and *Giardia* (oo)cys in water and selected vegetables. For faecal samples, the instructions of a commercial IMS kit will be followed. Commercially available fluorescent labelled *Cryptosporidium* and *Giardia* (oo)cysts will be used for spiking. The results of the inter-laboratory comparison will be shared with the consortium, and a SOP will be developed.

Task: JRP-PARADISE-PARADISE-WP4-T2 Development of post-DNA extraction enrichment strategies
Task start month **M25**; Task end month **M58**
Task Leader: **Mats Isaksson, SVA**; Deputy Task Leader: **Marieke Opsteegh, RIVM**
Task Participants: **RKI, ANSES, VRI, SVA, SLV, FOHM, INIAV, RIVM**
Description of the task:

- WP4-T2 takes place over the first, the second and the third annual period of the project.

The objective of this task is the development and evaluation of a protocol for post-DNA extraction enrichment based on sequence-based capture of low abundance target DNA in matrices such as faeces, different types of water (drinking, recreational, wastewater and washing water from fresh produce) and archived DNA from suspected foodborne outbreaks.
In Y5, WP4-T2 continues based upon what achieved during the previous annual periods of the project. An inter-laboratory comparison will be performed among WP4-T2 participants using the available SOP. SVA will prepare and distribute DNA prepared from different samples (food, faeces, and wastewater) and containing variable amount of *Cryptosporidium* and *Giardia* DNAs. The performance of the DNA enrichment will be assessed by comparison with the same qPCR assay used for the procedure evaluation, and a SOP will be developed.

Deliverables

Ref	Title	Due month
D-JRP-PARADISE-WP1.3	Report of the final meeting	M58
D-JRP-PARADISE-WP2.3	Report on limit of detection of amplicon-based and shotgun metagenomics	M58
D-JRP-PARADISE-WP2.4	SOP for FBPs detection using amplicon-based and shotgun metagenomics	M58

D-JRP-PARADISE-WP3.4	Report on the genetic population structure of *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP3.5	Report of interlaboratory comparison of MLST schemes for *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP4.4	Report of interlaboratory comparison of post-DNA extraction hybridization probe capture and MC-PCR for *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP4.5	Report of interlaboratory comparison of nanobodies-based magnetic capture for *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP4.6	Report of interlaboratory comparison of aptamer-based magnetic capture for *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP3.6	SOP for MLST schemes for *C. parvum* and *G. duodenalis*	M58
D-JRP-PARADISE-WP4.7	SOP for magnetic (oo)cysts capture based on aptamers and or nanobodies	M58
D-JRP-PARADISE-WP4.8	SOP for magnetic DNA capture based on hybridization probes	M58
Milestones		
Ref	Title	Due month
M-JRP-PARADISE-23	Final meeting (WP1)	M57

2.4.1.1.16 JRP20-R2-FBZSH3-DISCoVeR

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ-SH 3: Source attribution of bacterial foodborne zoonoses and antimicrobial resistance considering also the environment and non-livestock reservoirs (e.g. pets and wildlife) as sources**			
Research Project Title	**Discovering the sources of Salmonella, Campylobacter, VTEC and antimicrobial Resistance**			
Research Project Acronym	**DiSCoVeR**			
Leading Organisation	**P12-DTU**	Deputy Leading Organisation	**P30-RIVM**	
Project Leader	**Tine Hald**	Deputy Project leader	**Eelco Franz**	
Project Start month	**M25**	Project End month	**M60**	
Annual period of the OHEJP the work plan applies: Y5				

Participant	**1**	2	4	6	7	**8**	**9**	10	11	**12**
	Anses	Ages	Sciensano	NDRVMI	SZU	**VRI**	**BfR**	FLI	RKI	**DTU**
PM	**3,00**					**8,00**	**0,20**			**2,60**
Participant	**13**	14	15	16	17	18	19	20	**21**	**22**
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	**PHE**
PM	**3,70**								**2,06**	**0,75**
Participant	23	24	25	**26**	**27**	28	29	**30**	**31**	**32**
	UoS	OKI	NUIG	**TEAGASC**	**ISS**	IZSAM	IZSLER	**RIVM**	**WbvR**	**FHI**
PM				**1,08**	**8,30**			**4,80**	**2,51**	**1,32**
Participant	**33**	**34**	**35**	**36**	37	39	40	**41**	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**0,59**	**3,00**	**2,75**	**6,06**				**3,25**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

DiSCoVeR's objectives are in alignment with objectives of priority topic FBZ 2.1. for three of the main zoonotic bacterial pathogens (Salmonella, Campylobacter, and STEC/VTEC) and antimicrobial resistance (AMR). We will

- Fill knowledge gaps regarding potential sources of foodborne zoonoses by including data on non-livestock reservoirs and non-food sources and by providing source attribution estimates at different points in the exposure chain (e.g. at reservoir, retail and exposure) level and across EU regions and countries.
- Critically assess and improve existing source attribution models including approaches based on microbial subtyping, case-control studies, outbreak investigations and exposure assessment.
- Quantify the contributions of animal reservoirs, including wildlife and companion animals, food and environmental sources and their transmission routes to the burden of foodborne zoonotic disease, considering geographical differences throughout Europe and consortium partners.
- Use both phenotypic and genomic typing techniques for pathogen and antimicrobial resistance characterization, as well as epidemiological data, for the purposes of source attribution.
- Improve existing and develop new models for source attribution that account for multi-directionality of transmission incl. transmission among reservoirs and within the human population.
- Providing a critical evaluation of the evidence and uncertainty obtained by the source attribution models to improve the characterisation of the sources and transmission pathways implicated in the epidemiological cycles of the hazards focused by the project.
- Provide recommendations on how to transfer results from source attribution models in to actions for prevention and control.
- Evaluate the transferability of the source attribution approach in terms of opportunity to strengthen the technical and institutional capacity building for the One-Health surveillance.

The focus of this project will be on three of the main bacterial foodborne zoonotic pathogens in the EU for which previous source attribution analyses have generally neglected the environment and non-livestock reservoirs: non-typhoid *Salmonella* spp., *Campylobacter jejuni/coli*, and Shiga toxin-producing *Escherichia coli* (STEC/VTEC), incl. their antimicrobial resistant strains. Because of the transfer of antimicrobial resistant determinants between bacterial species, e.g. between commensals and pathogens, we will also attempt to include attribution approaches for AMR using metagenomics data. When relevant for the models applied, we will attempt to include data from all parts of the food production chain including the retail level. Finally, it should be noted that not all source attribution models are relevant or applicable to all the focus pathogens, and that data availability and accessibility often influence the choice of methods.

Description of work

WP1. Project coordination, administration, and stakeholder relations.

WP start month 25

WP end month 60

WP Leader: Tine Hald (DTU)

Deputy WP Leader: Eelco Franz (RIVM)

WP participants: All partners

Description of the WP: WP1 takes place over the first, second and third year of the project.

This WP is responsible for all reporting to the One Health EJP coordinating body and for organising 2-3 face-to-face meetings and quarterly web-based meetings during the 3-year project. Due to the relatively large number of consortium partners and the need for interaction between WPs, WP1 plays an important role in ensuring that milestones and final deliverables of the consortium are successfully

completed and communicated. The WP leader at DTU and deputy leader at RIVM are also the overall project coordinator and project deputy leader, which creates integrity throughout the project and ensure a continuous communication between the WPs and the timely dissemination of results. A Project Management Team (PMT) consisting of all WP and Task Leaders and their deputies is keeping track of progress and coordinates activities between WPs through monthly webmeetings.

To ensure coordination of work between WPs and the different hazard-specific tasks, WP1 started out by mapping the existing knowledge gaps and recommended new studies and/or methods that are needed to fill them. This was done in close collaboration with WP2 and was initiated by mapping the existing data available to the consortium members. This consist of data generated directly by the partners or publicly available data. Several of the consortium partners have or will be collecting new data during the course of the project, and the recommendations from this WP have guided the collection of specific samples from the environment and non-livestock reservoirs, and non-animal derived food sources, different water sources and soil.

In close collaboration with WP5, WP1 also takes responsibility for communicating with stakeholders at the EU-level (e.g. ECDC, EFSA, EMA) and Member State-level authorities, farmers' organisations and representatives from the food industry, as well as other projects within and outside the One Health EJP. In Month (M) 49, an online stakeholder workshop was held on January 22nd, 2021. Around 20 participants from EFSA, ECDC, EURLs, other relevant EJP projects, as well as Discover WP-leads joined the meeting. A second stakeholder workshop is planned for around M57, back-to-back with the final annual project meeting, where newly developed methods, results and recommendations for future actions will be presented and discussed. The stakeholder workshop is included as Milestone 5.2 in WP5.

Task: *JRPFBZ-1-WP1-T1 Project management*

Task start month 25; **Task end month** 60

Task Leader: Tine Hald (DTU); **Deputy Task Leader:** Eelco Franz (RIVM)

Task Participants: SVA, ANSES, ISS

Description of the task: The monthly PMT webmeetings and quarterly webmeetings with all consortium partners will continue. The final annual project meeting including all project participants as well as a 1-day stakeholder workshop will be hosted by ISS in M57.

Task: *JRPFBZ-1-WP1-T3 Data Management Plan (DMP)*

Task start month 25; **Task end month** 60

Task Leader: Tine Hald (DTU); **Deputy Task Leader**: Marianne Chemaly (ANSES)

Task Participants: All partners

Description of the task: Continuing updating of the DMP with a final update by the end of the project.

WP 2. Data – Coordination of the collection of genomic data, other microbiological data and epidemiological data.

WP2 takes place over the first, second and third year of the project.

Planning for 6M extension of the project, this workpackage will continue until M50 in the final year of DiSCoVeR.

We have extended the deadline for inclusion of new data to M50, although most data for the project datasets will be collected and available from end of Y4. After having compiled the final datasets in the beginning of Y5, the work of this WP is complete, and WP members will join WP4 and WP5 to support modelling efforts and assessment of results to inform policy decisions.

WP 3 Methods - Critical assessment/improvement of existing and development of new source attribution models.

Planning for 6M extension of the project, this workpackage will continue until M54 in the final year of DiSCoVeR.

WP start month 25

WP end month 54

WP Leader: Thomas Rosendal (SVA)

Deputy WP Leader: Lapo Mughini-Gras (RIVM)

WP participants: SSI, ANSES, NIPH, NCOH-UU, DTU, BfR, WBVR, ISS, PHE, INIAV

WP description: WP3 takes place over first, second and third year of the project.

This WP focuses on the cataloguing, evaluation and development of existing methods for source attribution as well as the development of new methods for the critical assessment of source attribution models and finally suggest novel approaches for source attribution. To fully utilise risk factor studies and risk/exposure assessments to subtyping and genomic information, this WP identifies and develop novel approaches of source attribution and will pass on these findings to WP4.

Task: JRPFBZ-1-WP3-T1 Assessing and developing source attribution methods based on microbial subtyping

Task start month 25; **Task end month** 54

Task Leader: Thomas Rosendal (SVA); **Deputy Task Leader**: Lapo Mughini-Gras (RIVM)

Task Participants: DTU, NIPH, ANSES, BfR, NCOH-UU, SSI, WBVR, INIAV, APHA, PHE

Description of the task: As it turned out, there is a considerably overlap between the objectives and activities of T1 and T2, and we have in principle merged the two task.

The WGS-based attribution models developed in Y4 will be applied to the collected WGS-data for Salmonella, Campylobacter and VTEC. The new approaches will to the extent possible take into account the phylogeny of the isolates to make more precise attribution estimates.

Task: JRPFBZ-1-WP3-T2 Assessing and developing source attribution methods based on phylogenetic data

Task start month 25; **Task end month** 54

Task Leader: Eva Møller Nielsen (SSI); **Deputy Task Leader:** Umaer Naseer (NIPH)

Task Participants: SVA, DTU, APHA, PHE

Description of the task: see above.

Task: JRPFBZ-1-WP3-T3 Evaluation of microbial subtyping source attribution by infectious disease modelling

Task start month 25; **Task end month** 54

Task Leader: Thomas Rosendal (SVA);

Task Participants: RIVM, DTU

Description of the task: We will complete the method for measuring the quality of source attribution based on subtyping based on simulations of bacterial population using the software Bacmita.

Task: JRPFBZ-1-WP3-T4 Assessing and developing approaches for source attribution of antimicrobial resistance based on metagenomics

Task start month: 31; **Task end month:** 54

Task Leader: Tine Hald (DTU); **Deputy Task Leader**: Lapo Mughini-Gras (RIVM)

Task Participants: INIAV

Description of the task: Metagenomic data collected by partners will be used as input for the developed model. A short term mission (between INIAV and DTU) as part of this task has been applied for and will, if granted, take place in the beginning of Y5.

WP 4 Results – Quantifying the contribution of various sources of foodborne zoonoses and AMR.

Planning for 6M extension of the project, this workpackage will continue until M56 in the final year of DiSCoVeR.

WP start month: 30

WP end month: 56

WP Leader: Lapo Mughini-Gras (RIVM);

Deputy WP Leader: Sara M. Pires (DTU)

WP participants: PIWET, NCOH-UU, BfR, TEAGASC, NVI, NIPH, ANSES, WBVR, VRI, SVA, INSA, VISAVET-UCM, SSI, ISS, APHA, PHE

WP description: WP4 takes place over first, the second and the third year of the project.

In WP4, data collected in WP2 and the methods assessed/developed in WP3 are used to quantify the contributions of the main sources of the three focus pathogens and AMR. Results will be presented per pathogen, attribution method, data type and, when/if applicable, geographical region/country. While overall ('European or multi-country') analyses will be performed, an important goal will be to identify country differences for pathogen-method combinations, which may reflect differences in their epidemiology. Particular attention are given to environmental and non-livestock (pets and wildlife) sources besides the 'traditional' livestock/food sources. Different methods are used in parallel to identify the best source attribution method for the type/amount of data available and the pathogen in question. The results of applied methods for each pathogen are compared in light of data availability and robustness, underlying uncertainties, the point in the food production chain where source attribution takes place, and the usefulness of different methods to answer different One Health questions.

Task: JRPFBZ-1-WP4-T1 Salmonella source attribution and comparison of results from different approaches

Task start month: 30; **Task end month:** 54

Task Leader: Sara Pires (DTU); **Deputy Task Leader:** Dariusz Wasyl (PIWET)

Task Participants: RIVM, ANSES, NIPH, VRI, INSA, VISAVET-UCM, APHA, PHE

Description of the task: We will produce the final source attribution estimates of the subtyping approaches (serovar and WGS-based) for *Salmonella*, and make a final comparison of the output from all the *Salmonella* models developed and applied in DISCOVER.

Task: JRPFBZ-1-WP4-T2 Campylobacter source attribution and comparison of results from different approaches

Task start month: 30; **Task end month:** 54

Task Leader: Lapo Mughini Gras (RIVM); **Deputy Task Leader:** Katel Rivoal (ANSES)

Task Participants: NCOH-UU, DTU, SVA, INSA, VISAVET-UCM, SSI, PHE

Description of the task: We will produce the final source attribution estimates of the subtyping approaches (7-loci MLST and WGS-based) for *Campylobacter*, and make a final comparison of the output from all the *Campylobacter* models developed and applied in DISCOVER.

Task: JRPFBZ-1-WP4-T3 VTEC source attribution and comparison of results from different approaches

Task start month: 30; **Task end month:** 56

Task Leader: Eelco Franz (RIVM); **Deputy Task Leader:** Gaia Scavia (ISS)

Task Participants: TEAGASC, DTU, ANSES, NVI, NIPH, VRI, SVA, INSA, VISAVET-UCM

Description of the task: We will produce the final source attribution estimates of the subtyping approaches (antigen/virulence genes and WGS-based) for VTEC, and make a final comparison of the output from all the VTEC models developed and applied in DISCOVER.

Task: JRPFBZ-1-WP4-T4 AMR source attribution results presented regionally and by region/country, for each applied method and integrated

Task start month: 30; **Task end month:** 56

Task Leader: Sofia Duarte (DTU); **Deputy Task Leader:** Thomas Hagenaars (WBVR)

Task Participants: VRI, INSA, VISAVET-UCM, RIVM

Description of the task: We will produce the final source attribution estimates of the subtyping approaches (ESBL resistance genes and metagenomic based) for AMR, and make a final comparison of the output from all the AMR models developed and applied in DISCOVER.

WP5 Conclusions, recommendations and policy translation.

WP start month: 33

WP end month: 60

WP Leader: Gaia Scavia (ISS)

Deputy WP Leader: Tine Hald (DTU)

WP participants: all partner institutions

Description of the WP: WP5 takes place over first, the second and the third year of the project.

WP5 aims at providing a critical evaluation of the evidence and uncertainty obtained by the source attribution models to improve the characterisation of the sources and transmission pathways implicated in the epidemiological cycles of the hazards in focus (*Salmonella*, *Campylobacter*, VTEC and AMR). In addition, the transferability of the source attribution approach will be evaluated in terms of opportunity to strengthen the technical and institutional capacity building for the One-Health surveillance. Technical evaluations will allow to describe strength, limitation and fit for purposes of methodologies for source attribution modelling being applied, in light of the current availability and gaps of data in the various sectors (clinical, food, animal, environment), and considering the limitations and barriers connected to the current operational field context (WP5-T1). Expert evaluation will allow to elucidate how project outcomes could be interpreted and used to improve hazard control policies at both EU and national level and to identify which resources and components of the surveillance programmes would be needed to optimise the applicability of source attribution approach in the field (Task 5.2). On this basis, conclusions and recommendations will be formulated with the support of the relevant stakeholders (in particular EFSA and ECDC) and taking into account

the control policies in place at the EU and national level, in the various sectors. In particular, the existing hazard specific control programmes such as the National Control Programme (NCP) for *Salmonella,* at the primary production level and other intervention strategies will be focused. Final recommendations will also be delivered in close cooperation with the WP2 of the EJP focusing 'Science to policy translation' to ensure an optimal level of harmonization within the EJP (Task 5.3).

This WP includes all the participating institutes. Activities will be organised into three separate, interdependent tasks. These will be carried out in close cooperation with the WP2, WP3 and WP4 leaders for the purposes of integration of contributions and comprehensive interpretation of the methodologies and output. Since the critical evaluation of the outcomes will require specific a robust knowledge on the epidemiology and surveillance context for each specific hazards, single hazard specific experts will be identified among participants and involved in the WP activities (expert group). Alignment with other projects within and outside the EJP (NOVA, Cohesive, Orion) will also be established in order to guarantee full internal harmonization and avoid duplication of the activities.

Task: JRPFBZ-1-WP5-T1 Technical expert evaluation of the methodologies for source attribution and their optimal requirements for infield applicability

Task start month: 41; **Task end month:** 57

Task Leader: Lapo Mughini Gras (RIVM); Deputy Task Leader: Thomas Rosendal (SVA)

Task Participants: ANSES, DTU, ISS, INSA, VRI

Description of the task: This task will take place over the second and third year of the project. It deals with the evaluation of the strength, limitation and fit for purposes of the methods for source attribution modelling being applied (WP3) for each hazard, in light of the current data availability and data gaps, limiting the applicability of the models (WP2). In Y4, we made a report on the "Critical and quantitative evaluation of existing and novel source attribution methods" using the TRACE approach. This assessment will further be turned into document useful for risk managers/decisions makers providing an overview of the advantages, limitations, and data requirements of the source attribution models available.

This activity will also describe how source attribution approaches could be optimised, for each hazard, for its infield applicability, taking into account the current context for surveillance, the hazard epidemiology and the future needs. On this basis a final prioritization of the best methodological options for source attribution approach, by hazard will be delivered.

Task: JRPFBZ-1-WP5-T2 Translating source attribution estimates into options for control policies

Task start month: 33; **Task end month:** 58

Task Leader: Gaia Scavia (ISS); **Deputy Task Leader**: Sara Pires (DTU)

Task Participants: SVA, SSI, INSA, NVI VRI

Description of the task: Under this task, the expert evaluation of the relevance of the results and the associated uncertainty in terms of public health will be carried out, in order to identify possible options for hazard control. In the first step, the evidence obtained by the current project and the elements of novelty granted by this novel comprehensive One Health approach will be used to further characterise the role of the various components of the epidemiological cycle of each single hazard, in the complexity of transmission pathways between animals, food, environment, and humans. Possible options for innovative hazard control intervention in the complex of the transmission pathways will then be evaluated/revised, taking into account the current policies in place at EU and national level. For this purpose, the current existing hazards' control programme and strategies in the various sectors

and tracts of the animal-environment-food-human chain have been mapped and is available in an inventory.

Task: JRPFBZ-1-WP5-T3 Use of source attribution approach into One-health framework for surveillance and control of Salmonella, Campylobacter, VTEC: final recommendations and conclusions

Task start month: 49; **Task end month:** 60

Task Leader: Tine Hald (DTU); **Deputy Task Leader:** Gaia Scavia (ISS)

Task Participants: all partners

Description of the task: This task takes place over the third year of the project. Under this task, outcomes from tasks 5.1 and 5.2 will be presented, shared and discussed with all partners and the main stakeholders, in order to elaborate on appropriate conclusions of this comprehensive source attribution exercise and deliver final recommendations to facilitate the translation into effective infield One Health surveillance and control policies. This activity will be carried out in close cooperation with WP2 of the EJP and other relevant EJP initiatives to ensure an optimal level of harmonization within the EJP. Beside EJP main stakeholders (EFSA, ECDC) other relevant stakeholders will be identified in the course of the project, depending on the results of the source attribution exercise. A dedicated stakeholder workshop will be organised to facilitate the discussion and identify the final key messages.

Deliverables

Ref	Title	Due month
D-JRPFBZ-1-WP4.1	Salmonella source attribution results presented regionally and by region/country, for each applied method	54
D-JRPFBZ-1-WP4.2	Campylobacter source attribution results presented regionally and by region/country, for each applied method and integrated	54
D-JRPFBZ-1-WP4.3	VTEC source attribution results presented regionally and by region/country, for each applied method and integrated	56
D-JRPFBZ-1-WP4.4	AMR source attribution results presented regionally and by region/country, for each applied method and integrated	56
D-JRPFBZ-1-WP5.2	Document: Transmission pathways of Salmonella, Campylobacter, VTEC, and antimicrobial resistance from animals, food, and environment to humans: One-Health characterisation of the source and components and options to inform control policies.	57
D-JRPFBZ-1-WP5.3	Document: translation of the source attribution methodological approach to the One-Health context for surveillance of Salmonella, Campylobacter, VTEC, and antimicrobial resistance: options, needs, prioritization.	58
D-JRPFBZ-1-WP5.4	Final conclusions and recommendations for the use of source attribution approach into One-health framework for surveillance and control of Salmonella, Campylobacter, VTEC, and antimicrobial resistance	60

Milestones

Ref	Title	Due month
M-JRPFBZ-1-23	Completion of dataset for all species	50
M-JRPFBZ-1-24	Third annual project meeting hosted by ISS	57
M-JRPFBZ-1-25	Stakeholders Workshop	57
M-JRPFBZ-1-26	Final update of Data Management Plan	60

2.4.1.1.17 JRP21-R2-FBZ3.1-BIOPIGEE

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ 3.1: Benchmarking biosecurity practices for pig farming across Europe using national surveillance data and management standards for identifying best practice to prevent biological hazards, particularly Salmonella and hepatitis E virus, from entering the food supply chain**		
Research Project Title	**Biosecurity practices for pig farming across Europethank**		
Research Project Acronym	**BIOPIGEE**		
Leading Organisation	**P9-BfR**	Deputy Leading Organisation	**N/A**
Project Leader	**Elke Burow**	Deputy Project leader	**Veit Zoche-Golob**
Project Start month	**M25**	Project End month	**M60**

Annual period of the OHEJP the work plan applies: Y5

Participant	**1**	**2**	4	**6**	7	**8**	**9**	10	**11**	12
	Anses	**Ages**	Sciensano	**NDRVMI**	SZU	**VRI**	**BfR**	FLI	**RKI**	DTU
PM	**2,00**	**7,00**		**10,00**		**9,00**	**12,00**		**12,00**	
Participant	13	14	**15**	16	17	18	19	20	**21**	22
	SSI	UT	**VFL**	INIA	UCM	MVNA	INRA	IP	**APHA**	PHE
PM			**3,70**						**7,85**	
Participant	23	24	25	26	27	28	29	**30**	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	**RIVM**	**WbvR**	FHI
PM					6	9		**0,62**	**7,52**	
Participant	**33**	**34**	35	36	37	39	40	**41**	42	43
	NVI	**PIWET**	INIAV	INSA	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**1,00**	**1,00**						**4,00**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

WP1 Objectives

- Coordination of the project BIOPIGEE
- Organisation of final project meeting
- Revision and publication of the data management plan
- Compilation of the final project report

Description of work

WP: 1 Project coordination and integration of results

WP start month: M25

WP end month: M60

WP Leader: BfR (Elke Burow)

Deputy WP: BfR (Veit Zoche-Golob)

WP participants: All members of BIOPIGEE

Description of the WP: The first work package leads and coordinates the project. Exchange between work packages and integration of results, as well as active linking to external partners and projects (EU activities) will be organised. The contact to OHEJP coordinators will be maintained. A database structure to store data among all WP will be provided. In the third project year, the final project meeting will be conducted, the data management plan will be revised and published, and all parts for the project reports, deliverables and milestones will be collected from WP-leaders and delivered to OHEJP.

Task: JRP21-WP1-T1 Project management and meeting organisation

Task start month: M25

Task end month: M60

Task Leader: BfR (Elke Burow)

Deputy Task Leader: BfR (Veit Zoche-Golob)

Task Participants: BfR, all BIOPIGEE members

Description of the task: The project organisation will keep the information flow between the WPs. Problems of participants will be solved, a place for common data exchange will be established and a smooth working atmosphere will be supported. For this, emails, web-conferences and eventually newsletters will be used. During the whole project period, the coordinators will take part in at least two European conferences that deal with the proposed project's topic, in order to inform the scientific and non-scientific audience about the BIOPIGEE project and its results.
Furthermore, a smooth communication will be guaranteed between the WP3 of OHEJP and the BIOPIGEE consortium. Participant's inquiries will be collected, answered (if possible) and forwarded to the board (if necessary). The main contact person of the proposed project will be Elke Burow, deputy is Veit Zoche-Golob.
All kind of exchange between WPs will be supported. The connections between WPs, as shown in the Pert chart, need to be kept vital. Not only data, but also ideas and criticism will be exchanged with the help of the project coordination. For this, inter alia surveys will be circulated periodically, asking for progress, cooperation and exchange.

The coordination team will actively search for further external partners and coordinate the exchange with external partners and projects.
The final project meeting is planned to be conducted (together with IZSAM) for all BIOPIGEE participants and eventually guests in M58.
The task will mainly be carried out by E. Burow and V. Zoche-Golob.

Task: JRP21-WP1-T2 Development of data management plan

Task start month: M43

Task end month: M60

Task Leader: BfR (Elke Burow)

Deputy Task Leader: BfR (Veit Zoche-Golob)

Task Participants: all BIOPIGEE members

Description of the task: Following H2020 rules a comprehensive data management plan will be further developed for the BIOPIGEE project. The plan includes the following points: data summary, making data findable, making data openly accessible, making data interoperable, increase data re-use, allocation of resources, data security and ethical aspects. This will be achieved by close cooperation with the EJP-OneHealth WP4-group, which proposed support in developing the data management plan. The final version of the data management plan will be provided to OHEJP-PMT (M60).

Task: JRP21-WP1-T3 Provision of project deliverables and reports

Task start month: M53

Task end month: M60

Task Leader: BfR (Elke Burow)

Deputy Task Leader: BfR (Veit Zoche Golob)

Task Participants: BfR, AGES, ANSES, APHA, BFR, ISS, IZSAM, NDRVI, NVI, PIWET, RKI, SVA, VFL, WBVR
Description of the task: Project deliverables of all WPs will be collected, checked and transferred to the board of EJP-OneHealth. Further, the final project report will be compiled with the help of WP-Leaders and also delivered to the board (M60).

Deliverables

Ref	Title	Due month
D-JRP21-WP1.19	Revised data management plan submitted	M60
D-JRP21-WP1.23	Final project report submitted	M60

Milestones

Ref	Title	Due month
M-JRP21-33	Final meeting successfully organized	M58

WP2 Objectives

- Complete field studies to determine the effectiveness of biosecurity controls.

- Quantify effect of biosecurity measures and compile evidence from all tasks to inform the catalogue of effective biosecurity measures (WP5).
- Complete analysis of hepatitis E sequence data to infer differences in strain presence and diversity across partner countries with respect to biosecurity.

Description of work

WP : JRP21-WP2 Biosecurity effectiveness studies

WP start month: M25

WP end month: M56

WP Leader APHA (Richard Smith)

Deputy WP Leader BfR

WP participants APHA, SVA, WBVR (UU), BfR, VFL (EMU), PIWET, VRI, IZSAM, ISS, AGES (VMU), NDRVMI

Description of the WP: A review of biosecurity audit protocols supplemented by a brief, focused review of relevant literature on the effectiveness of biosecurity practices will define the most suitable protocol(s) to be used on a selection of pig farms in each participating country, covering a representation of European climates and production types. The farms will be identified as high or low risk, focusing on *Salmonella* and/ or hepatitis E virus (HEV), to allow for case-control analysis in order to quantify the benefits of each practice. A structured approach will be used to standardise farm selection to reduce known biases and to provide criteria for ranking high/ low risk. Information collected on slaughterhouse biosecurity best practice will also define the impact on carcase contamination. The results will benchmark standards in each country and define overall best practice. Field studies will be completed to provide evidence for key knowledge gaps on the effectiveness of controls, particularly focused on the effect of biosecurity on HEV. The work on HEV will be supported by the HEVnet project providing a facility to upload sequences and metadata to allow investigation of HEV subtype diversity. This integrative approach, drawing evidence from a wide range of sources, will inform quantification of the benefit of the biosecurity practices against *Salmonella* and HEV at farm and at slaughter, which will be vital to the assessments of the cost and effectiveness of biosecurity analyses (WP4) and benchmarking biosecurity practice (WP5).

Task: JRP21-WP2-T2 Application of the biosecurity protocol

Task start month 27
Task end month 52
Task Leader: PIWET
Deputy Task Leader: AGES
Task Participants: BfR, APHA, WBVR, SVA, VFL, PIWET, IZSAM, AGES, ISS, NDRVMI, VRI, IZSLER
Finalisation of preparing outcome for dissemination.

Task: JRP21-WP2-T3 Slaughterhouse biosecurity practices

Task start month 37
Task end month 52
Task Leader: VFL
Deputy Task Leader: ISS
Task Participants: VFL, APHA, ISS, VRI, BfR, AGES, WBVR, IZSLER
Finalisation of preparing outcome for dissemination.

Task: JRP21-WP2-T4 Field studies

Task start month: M25

Task end month: M54

Task Leader: APHA

Deputy Task Leader: IZSAM

Task Participants: APHA, IZSAM, WBVR, ISS, IZSLER

Description of the task: The field study visits and the testing of samples will be completed in this reporting year. The data generated from the visits will be collated and cleaned. Descriptive analysis and modelling of results will be carried out to produce evidence relevant to the effectiveness of biosecurity on *Salmonella* and HEV. The results will be summarised in a report and supplied to WP4 and 5.

Task: JRP21-WP2-T5 Analysis of hepatitis E prevalence and subtypes

Task start month: M37

Task end month: M56

Task Leader: RIVM

Deputy Task Leader: ISS

Task Participants: RIVM, WBVR, APHA, VRI, ISS, PIWET

Description of the task: The Online HEVnet database facilitates data visualization through geographical maps, phylogenetic trees and pie charts. One of the outcomes of these collaborative activities with HEVnet will be the presentation of study data and an evaluation of the circulation of HEV strains among BIOPIGEE partner countries. Information on the persistence of HEV strains or movement of strains among countries will be correlated to biosecurity measures collected by the study protocol from T2.2. This analysis will feed into the catalogue of effective biosecurity measures (WP5). A report will be produced to summarise these findings supplied to WP5 and 6 and the results of the sequence analysis will be supplied to HEVnet.

Deliverables

Ref	Title	Due month
D-JRP21-WP2.12	Produce report on evidence gathered by field studies	M54
D-JRP21-WP2.18	Report on correlation of biosecurity practice with HEV sequences to WP5 and 6, sequence analysis of hepatitis E to HEVnet	M56

Milestones

Ref	Title	Due month
M-JRP21-19	Completion of farm visits and lab work	M54
M-JRP21-21	Uploading of sequences to HEVnet	M54

WP3 Objectives

- Main objective: To obtain better knowledge on how to combat *Salmonella* and HEV in biofilms/surface microlayers by disinfection in pig farms, so that this knowledge can be used for further development of a common biosecurity protocol
- Sub-objective 1: To establish a standardized method for testing the effect of disinfectants on *Salmonella* in biofilm.
- Sub-objective 2: To obtain knowledge on the effect of relevant disinfectants on *Salmonella* in biofilm by using the standardized method and a panel of relevant *Salmonella* strains from herds and abattoirs.
- Sub-objective 3: To use the evaluated models to test disinfectants on HEV in biofilms/surface microlayers
- Sub-objective 4: To develop a suitable HEV infectivity assay to test different kind of samples that can be contaminated with HEV.
- Sub-objective 5: To implement, optimize and adapt a HEV infectivity assay for pig and environmental samples.
- Sub-objective 6: To assess HEV stability in relation to disinfection approaches in pig farms.

Description of work

WP3: Impact of disinfection on persistence of *Salmonella* and HEV in biofilm

WP start month: M25

WP end month: M56

WP Leader: Wim van der Poel (WBVR)

Deputy WP Leader: Live L. Nesse (NVI)

WP participants: WBVR, NVI, RKI, APHA

Description of the WP: The aim of the present WP is to obtain better knowledge on how to avoid and combat the build-up of environmental reservoirs of *Salmonella* and HEV in pig farms by disinfection. This knowledge will be the basis for rating effectiveness of cleaning and disinfection included in the catalogue of biosecurity measures and the subsequent benchmarking (WP5). This will also contribute information to WP4 as the cost of disinfections to remove biofilms will impact overall biosecurity cost and effectiveness, and also to WP6 to raise awareness of the risks of biofilms and the difficulty in removing them.

Salmonella may be introduced into herds by contaminated feed or breeding animals. However, once introduced, it is well known that *Salmonella* can persist in farm environments from several months to years. Cleaning and disinfection are therefore important biosecurity measures. *Salmonella* are in general good biofilm-formers, and when residing in biofilms in the environment they are extremely well protected against environmental stress, including various disinfectants. Consequently, it is imperative to use disinfectants able to eradicate *Salmonella* in biofilm. Today, however, disinfectants are chosen based on their ability to kill planktonic bacteria in standard laboratory tests, and these tests cannot be used to predict the effect on the bacteria in biofilm. Standard methods for testing the effectivity of disinfectants against *Salmonella* do not include biofilm-associated forms of the pathogens, thus making it difficult to give advice on which disinfectants to use. This problem will be addressed in WP3.

The aim of the *Salmonella* part of WP3 is to establish a standardized test for assessing the effect of disinfectants on *Salmonella* in biofilm, and apply this test to evaluate disinfectants for use in swine production. The work will be organized into three subtasks.

HEV may be introduced in pig herd via different routes. The most important introduction routes in pig herds are not really known. Contaminated feed, breeding animals as well as workers coming to farms

may all play a role. Once introduced, HEV may persist in herds and farm environments for years. Good biosecurity protocols for HEV have not been developed yet. Usefulness of cleaning and disinfection are not really known because research is hampered by the fact that there is not a method available to test for HEV infectivity. It is possible that HEV persists better in environments with good biofilm-forming bacteria. Consequently, it may be indicated to use disinfectants able to inactivate biofilm forming bacteria as well as hepatitis E virus itself. This approach will be tested in WP3.

For HEV, the developed infectivity test will be further optimized and standardized as much as possible. This ready to use and standardized method will be employed to assess the effect of HEV biosecurity practices, e.g. disinfection, on surface microlayers/biofilms contaminated with infectious HEV.

Task JRP21-WP3-T2: Effect of disinfectants on biofilm-associated wild type *Salmonella*

Task start month: M25

Task end month: M56

Task Leader: NVI

Deputy Task Leader : APHA

Task Participants: RKI, NVI, APHA

Description of the task: The objective of this task is to test the effect of relevant disinfectants against biofilm residing wild type *Salmonella* collected from farm and abattoirs. The validated method established in T 3.1 and the strain panel selected in T 3.2-ST-1 will be used to test the effect of disinfectants commonly used in swine production. Several disinfectant types will be included, e.g. quaternary ammonium compounds (QAC), glutaraldehyde and oxidizing agents. Through this testing, we will identify the disinfectants most effective against *Salmonella* in biofilm. The results on the effectiveness of disinfectants will be added to the catalogue of biosecurity measures (WP5).

Sub-Task JRP21-WP3-T2-ST2 Assessing the effect of disinfectants

Sub-Task start month: M37

Sub-Task end month: M56

Sub-Task Leader: NVI

Deputy Sub-Task Leader: RKI

Sub-Task Participants: APHA, RKI, NVI

Description of the sub-task: The objective of this sub-task is to assess the effect of various disinfectants on wild type *Salmonella* in biofilm. The validated method established in T 3.1 and the strain panel selected in T 3.2-ST-1 will be used to test the effect of disinfectants commonly used in swine production. Several disinfectant types will be included, e.g. quaternary ammonium compounds (QAC), glutaraldehyde and oxidizing agents. The recommended user concentrations and exposure times for each disinfectant will be used in the testing. Depending on the results, other concentrations and exposure times may also be tested, and separate testing of different active substances may also be done.

Task JRP21-WP3-T3: Study of HEV stability in relation to disinfection approaches

Task start month: M25

Task end month: M56

Task Leader: WBVR

Deputy Task Leader: WBVR

Task Participants: WBVR

Description of the task: The objective of this subtask will be to develop and optimize a culture system for hepatitis E virus the developed infectivity test will be further optimized and standardized as much as possible. This ready to use and standardized method will be employed to assess the effect of HEV biosecurity practices, e.g. disinfection, on surface microlayers/biofilms contaminated with infectious HEV.

Sub-Task JRP#-WP3-T3-ST3

Sub-Task start month: M49

Sub-Task end month: M56

Sub-Task Leader: WBVR

Deputy Sub-Task Leader: WBVR

Sub-Task Participants: WBVR

Description of the sub-task: The objective of this subtask will be to adapt, as needed, the method for testing of infectious HEV stability in surface microlayers/ biofilms to be suitable for testing of different strains of HEV genotype 3 found in different microlayers/biofilm matrices in pig farms. For different kinds of samples, preparation and processing methods will be optimized to improve the sensitivity and the selected assay. A selection of HEV gt3 strains in pig farm surface microlayers/biofilms will be tested while the assay will be adapted for sensitivity.

Deliverables

Ref	Title	Due month
D-JRP21-WP3.19	Information on the effect of different disinfectants on *Salmonella* in biofilm	M56
D-JRP21-WP3.20	HEV infectivity test adapted for testing of HEVs in biofilm	M56

Milestones

Ref	Title	Due month
M-JRP21-23	Relevant disinfectants are tested against *Salmonella* in biofilm	M56
M-JRP21-24	Relevant disinfectants are tested against HEV in surface microlayers/biofilms	M56

WP4 Objectives

- Quantification of the number of infected pigs and human cases depending on the effectiveness of (biosecurity) intervention measures
- Economic assessments depending on the effectiveness of (biosecurity) intervention measures and associated costs
- Development of one QMRA model for different zoonotic pathogens

- Identification of the economically optimum combination of best practice (biosecurity) intervention measures by consideration of scarce resources, different zoonotic pathogen and effectiveness level

Description of work:

WP 4: Modelling of the cost and effectiveness of biosecurity measures

WP start month: M25

WP end month: M56

WP Leader: Robin Simons

Deputy WP Leader: Mathieu Andraud

WP participants: AGES (VMU), APHA, ANSES, SVA

Description of the WP 4: This work package will take place over years 3, 4, and 5 of the OHEJP. The overall aim of the work package is to assess the effectiveness and efficiency of the implementation of standard and specific intervention measures on prevalence reduction of *Salmonella* and HEV along the pig supply chain by consideration of e.g. differences in the effectiveness of intervention measures, pig production systems across Europe (e.g. herd size), temporal aspects (i.e. dynamic pig cycle, disease prevalence dynamics), spatial aspects (i.e. individual MS and EU), supply structure, fluctuations of supply, demand and prices on the market (e.g. meat and feed price, which are necessary for the economic welfare analysis). The partners of the presented work package will maintain close contact to partners of WP 1, 2, 3 and 5 for legal implications of data sharing and the BIOPIGEE database structure of the catalogue of biosecurity measures will be used for insertion and extraction of measure's effectiveness and costs. The goals of work package 4 will be delivered via 4 tasks.

Task 4.2: Stochastic simulations on the effectiveness of biosecurity measures

Task start month: M33

Task end month: M56

Task Leader: Robin Simons

Deputy Task Leader: Mathieu Andraud

Task Participants: APHA, ANSES, SVA

Description of the task 4.2: Task 4.2 takes place over years 3, 4, and 5 of EJP. In this task we will adapt currently available transmission models such as QMRA for *Salmonella* and SimInF model for HEV and/or *Salmonella* of the consortium partners in order to analyse the impact of biosecurity measures on prevalence reduction of the zoonotic pathogens. The stochastic transmission models will simulate the spread of *Salmonella* and HEV across the production stage at the farm level with the provided set of biosecurity measures from WP 2 and WP 3, as well as with evidence-based best-practice measures from the literature search in WP5 (catalogue of biosecurity measures, accessed via collective database structure). The models will be developed for countries, including FR and, if possible also the UK, DE, and IT. The models will be adapted with the current knowledge from epidemiology, such as transmission parameters, available demographical data, herd management data, and the provided collected data on the effectiveness of biosecurity measures from WP 2, 3 and 5.

The outcome of WP 4.2 will be the level of prevalence (i.e. number of infected pigs at the farm level) i) without such biosecurity measures, ii) with individual standard biosecurity measures, iii) with individual specific mitigation measures, and/or iv) combination of a set of biosecurity measures.

Sub-Task 4.2.3: Simulation runs for the identified effective biosecurity measures

Sub-Task start month: M37

Sub-Task end month: M56

Sub-Task Participants: APHA, ANSES, SVA

Description of the Sub-Task: The models (QMRA model for *Salmonella* and SimInF model for HEV and/or *Salmonella*) will simulate the spread of the transmission of *Salmonella* and HEV infection at the farm level i) without biosecurity measures, ii) with individual standard biosecurity measures, iii) with individual specific mitigation measures, and/or iv) combination of a set of biosecurity measures. In this context, we will also consider the fact that biosecurity measures are implemented only for a proportion of the farms, compared to the scenario that all farms implement such standard measures. This is important because biosecurity measures are not universally applied within Member States and this will influence the effectiveness of the measures to reduce human illness overall (see WP 4.3). However, the outcome of WP 4.2.3 will be the level of prevalence at farm level for the scenarios and will be used in WP 4.3. and WP 4.4.

Task 4.3: Merge of models into one QMRA

Task start month: M34

Task end month: M56

Task Leader: Robin Simons

Deputy Task Leader: Cahterine McCarthy

Task Participants: APHA, ANSES, SVA

Description of the task 4.3: Task 4.3 takes place over the years 3, 4 and 5 of EJP. In WP 4.3 the different outcomes of the transmission models (i.e. estimated prevalence at the farm level from the SimInF and QMRA models) at the primary production stage will be matched to a single QMRA model on *Salmonella* and HEV, which covers the entire food supply chain (i.e. subsequent processing stages as slaughterhouses but also the human sector). Data on the effectiveness of biosecurity measures at the slaughterhouse level from WP2 (T2.3, collected in the BIOPIGEE's catalogue of biosecurity measures in the database structure maintained in WP5) and/or the temperature impact on contamination reduction on the subsequent processing stages, and consumption data for pig meat in different countries will be incorporated in the single QMRA zoonotic pathogen model. The final outcome of the one QMRA zoonotic pathogen model will be the number of human cases for each considered pathogen. The same countries (FR and if possible also the UK, DE, IT) will be used to cover the range of potentially heterogeneous country-specific circumstances, such as the effectiveness of biosecurity measures, herd demographical data, and consumption data. The consideration of different country-specific circumstances is necessary in order to identify the "best" combination of cost-effective biosecurity measures across European countries. The outcome of WP 4.3, i.e. *Salmonella* and HEV prevalences at animal level and human level will feed into WP 4.4.
Sub-Task 4.3.2: Simulation runs with one QMRA zoonotic pathogen model

Sub-Task start month: M45

Sub-Task end month: M56

Sub-Task Participants: APHA

Description of the Sub-Task: Different simulation runs with the one QMRA zoonotic pathogen model

Task 4.4: Economic model of biosecurity measures across Europe

Task start month: M37

Task end month: M56

Task Leader: AGES/VMU (Annemarie Käsbohrer)

Deputy Task Leader:

Task Participants: AGES (VMU)

Description of the task 4.4: Task 4.4 takes place over the years 4, and 5 of OHEJP. In this task we will assess the economic profitability of the implementation of standard and specific intervention measures along the pig supply chain using the outputs of WP 2, and WP 4.1-4.3. .1-4.3. The provided prevalence, with and without mitigation measures, from WP.4.2 and WP 4.3 will be translated into a monetary benefit and compared with the associated cost of the respective biosecurity measures collected in WP 2 and WP 4.1 (i.e. the WP 4 will highlight whether the proposed combination of biosecurity measures from WP 2, WP 3 and WP 5 offer an economic advantage). The economic model will integrate different financial and economic assessments such as cost-benefit-analysis, optimization approach (i.e. least-cost combinations of most effective sets of biosecurity measures), general production and welfare approaches, and if the monetary benefit for certain measures cannot be determined, we will use the cost-effectiveness approach. The overall output of WP 4 will efficiency combination of effective biosecurity measures, which consider the highest efficiency in the reduction of zoonotic pathogens, but also the least expensive of the implemented measures in Europe. The economic calculation will provide statements of the efficiency for i) individual standard biosecurity measures, ii) individual specific mitigation measures, or iii) a combination of a set of biosecurity measures for the entire pork production chain and also for individual stages in the production stages, in order to determine the surplus or losses per stage in the supply chain, when specific biosecurity measures are implemented. These different economic assessments and associated methods (economic models) as well as the collected economic data in WP 2.1 and WP 4.1 will be incorporated in a user-friendly interface tool (see WP 6).

Sub-Task 4.4.1: Performing economic assessments of best practice biosecurity measures

Sub-Task start month: M37

Sub-Task end month: M56

Sub-Task Participants: AGES (VMU)

Description of the Sub-Task: In this task we will use the outputs of WP 2 and WP 4.1 (i.e. collected cost data of biosecurity measures and data about the pig performance), and WP 4.2 and 4.3 (i.e. number of infected pigs and humans without and with (combined) biosecurity measures). Different economic methods will be applied depending on the stage of the supply chain and considered number of biosecurity measures. While the benefit-cost ratio provides information about the efficiency of individual implemented measures, the optimization approach, attempts to find a combination of mitigation measures that cause the highest benefit for society. The economically optimal disease-biosecurity policy is that which incurs the lowest attainable economic costs i.e. the least-cost combination of biosecurity expenditures and losses. In this context, the combination of different effective biosecurity measures will be analysed to determine the maximum net benefit i.e. maximizing the reduction of losses by consideration of the resources invested. If the monetary benefit for certain measures cannot be determined, we will use the cost-effectiveness approach. The economic calculation will provide statements of the efficiency for i) individual standard biosecurity measures, ii) individual specific mitigation measures, or iii) a combination of a set of biosecurity measures for

the entire pork production chain and also for individual stages in the production stages, in order to determine the surplus or losses per stage in the supply chain, when specific biosecurity measures are implemented. This WP will highlight whether the proposed standard-, specific or combination of biosecurity measures from WP 2, WP 3 and WP 5 offer an economic advantage for individual EU members or across Europe (represented by FR and if possible also UK, DE, and IT) to reduce the prevalence of *Salmonella* and/or HEV in the pig supply chain.

Sub-Task 4.4.2: Performing production and welfare economic assessments

Sub-Task start month: M45

Sub-Task end month: M52

Sub-Task Participants: AGES (VMU)

Description of the Sub-Task: In this Sub-Task of WP 4, welfare economic calculations will be carriedout in order to provide information on the prices at which producers would have to offer their products in order to be profitable with the implemented biosecurity measures (WP 4.4). This calculation is necessary, as individual benefits (e.g. low number of human cases) are often visible at the end of the production stages, and not directly at the farm level. N.B. the reduction of human cases can be an (partially) effect due to the implemented measures at the primary production. An equilibrium market price for Europe (based for the countries chosen: FR and if possible also UK, DE, IT) will be estimated for the implemented mitigation measures at the production and/or subsequently stages in the pig production chain in order to reduce the prevalences of *Salmonella* and HEV.

Deliverables

Ref	Title	Due month
D-JRP21-WP4.11	Model Output: Number of animal cases with and without biosecurity measures	M53
D-JRP21-WP4.16	Economic calculation	M55
D-JRP21-WP4.17	Model output: Number of human cases with and without biosecurity measures	M55

Milestones:

Ref	Title	Due month
M-JRP21-20	Application of appropriate economic methods based on available data	M51
M-JRP21-22	Matching of different simulation model approaches to one	M55
M-JRP21-27	Economic model for the assessments of profitability of biosecurity measures	M56

WP5 Objectives

- Finalized integration of gained knowledge on the effectiveness and costs of biosecurity measures studied in WP2-4 into the catalogue of biosecurity measures
- Finalized systematic review/meta-analysis to further fill the catalogue with relevant effective measures
- Applying machine learning approaches to generate further information on measure's effectiveness
- Survey of the expert panel to assess relevance/ weights of biosecurity practice
- Development of a benchmark system to assess biosecurity practice for its effectiveness and relevance to reduce/limit *Salmonella* and HEV occurrence in pig production

Description of work:

WP: 5 Benchmark of biosecurity practice

WP start month: M27

WP end month: M58

WP Leader: BfR

Deputy WP: APHA

WP participants: BfR, APHA, IZSAM, NDRVMI, AGES, PIWET, SVA, WBVR

In WP5, first 1) a catalogue of biosecurity measures and their effectiveness, confidence and costs to reduce/limit occurrence of *Salmonella* and hepatitis E virus (HEV) in pig production and abattoir will be compiled and filled with information from different sources (studies, literature, machine learning, panel) (see sample spreadsheet Table 2 in the full proposal document). In a second step, 2) biosecurity practices (measures, categories, overall) will be benchmarked for their relevance to limit/reduce *Salmonella* and HEV in pig production. Different production stages and European regions will be considered.

In T5.1, the gained knowledge on effectiveness, confidence and costs of biosecurity measures from WP2-4 (results from cross-sectional on-farm study, study on slaughterhouse biosecurity, specific field studies, disinfection and biofilm, modelling effectiveness and costs) will be integrated in the catalogue of biosecurity measures which will refine the initial list of potentially relevant effective measures (biosecurity protocol developed in T2.1) for *Salmonella* and HEV. Knowledge gaps in the effectiveness will be filled by a literature search on peer-reviewed articles (T5.2) which will continue the brief search in T2.1, expand to a meta-analysis and last until M50 in order to collect most current published knowledge. If necessary, information from machine learning (T5.3) and an expert panel (T5.4) will supplement. Finally (5.5), biosecurity practice will be benchmarked for its effectiveness/relevance in order to limit/ reduce *Salmonella* and HEV occurrence in pig production. The results of WP5 will feed into WP4 and will be incorporated into the development of a support tool offered to veterinarians/consultants/farmers (T6.2) and be disseminated to stakeholders at a final workshop in (T6.3).

Task: JRP21-WP5-T1: Data integration from WP2-4 into a catalogue of biosecurity measures

Task start month: M27

Task end month: M56

Task Leader: BfR

Deputy Task Leader: NDRVMI

Task Participants: BfR, NDRVMI, PIWET, SVA, APHA, AGES, IZSAM, WBVR

Description of the task: The catalogue of biosecurity measures relevant to limit/reduce *Salmonella* and HEV occurrence will be finalized and last information from other WPs will be integrated.

Task: JRP21-WP5-T2 Literature review/meta-analysis

Task start month: M27

Task end month: M50

Task Leader: IZSAM

Deputy Task Leader: BfR

Task Participants: PIWET, SVA, APHA, BfR, AGES, NDRVMI, IZSAM, WBVR

Description of the task:

The literature review/meta-analysis will be finalized and last relevant findings will be incorporated in the catalogue of biosecurity measures.

The effectiveness may, based on the source of information, be expressed in different scale levels and units as e.g. reduction in prevalence or log steps, also depending on whether it was determined in cross-sectional, intervention or experimental study design or on e.g. country, herd or animal level.

Following principles of meta-analysis, for each measure, an overall value will be estimated. In case information from literature does not allow using odds ratios, effectiveness will be expressed as e.g. being low, medium or high and the expert panel (T5.4) will help to add ratings here.

In month 50, the review/meta-analysis will be finalized and built the base of T5.3 to T5.5.

Task: JRP21-WP5-T3 Machine learning approaches

Task start month: M53

Task end month: M57

Task Leader: BfR

Deputy Task Leader: APHA

Task Participants: BfR, APHA

Description of the task:

We will use a deep learning technique on our database structure to make predictions on certain features missing in the catalogue of biosecurity measures: If, e.g. effectiveness of floor disinfection in stables in southern countries may not be deduced from the literature, we will predict it. Machine learning approaches have been shown to automatically detect pattern in big datasets and to make predictions when learned on sufficient data. At this stage, the project consortium will have assembled a huge amount of data given the vast number of biosecurity measures and the associated features (cost, effectiveness, pathogen, country & region of application, production stage, in-/external measure, confidence, source of information). A deep learning approach can make use of automatic feature learning, i.e. the algorithm can learn to combine multiple features into a new set of abstract features. The latter set can contain new information that we want to make use of. To achieve this, the program consists of multiple layers of connected nodes. The connections are built by the learning of the algorithm using the big dataset. As results of machine learning cannot be verified by logical implications (“black box approach”), we will discuss these results with the expert panel (T5.4) and stakeholders during the third workshop (WP6).T5.3 is finalized in month 57.

Task: JRP21-WP5-T4 Expert panel to add estimations on effectiveness/ weights

Task start month: M33

Task end month: M51

Task Leader: SVA

Deputy Task Leader: BfR

Task Participants: BfR, SVA, APHA, AGES, PIWET, NDRVMI, IZSAM, WBVR

Description of the task:

In the third year, the expert panel will support the development of the benchmark system by assessing relevance and weights of biosecurity practices, within categories of biosecurity measures and between categories (built from the catalogue and the feedback from the first survey of the panel in the year before). Only measures with evidence for their effectiveness/confidence to limit or reduce *Salmonella*/HEV occurrence in the pig production chain will be considered. Furthermore, experts will be asked to provide experience on the critical points to be considered when implementing specific measures (with a focus on those with diverging reports).

For this, a questionnaire will be developed and distributed to experts in the field of biosecurity in pig production. This survey will be carried out at the 3rd workshop in WP6 and sent to the experts via email/online. Using the questionnaire, experts will be asked to rank relevance of biosecurity practice (measures and categories).

The survey of the expert panel will be finalized in month 51.

Task: JRP21-WP5-T5 Benchmark system for effectiveness of biosecurity practice

Task start month: M51

Task end month: M58

Task Leader: BfR

Deputy Task Leader: APHA

Task Participants: BfR, SVA, APHA, AGES, PIWET, NDRVMI, IZSAM, WBVR

Description of the task:

Based on the catalogue of biosecurity measures built in the former tasks of WP5 and the assessment of the panel, biosecurity practice (measures, categories, overall) relevant for *Salmonella* and HEV in pig production will be benchmarked, i.e. we will provide a scheme that enables biosecurity practices to be compared amongst each other. The final benchmark of biosecurity practice will only be based on measures for which evidence was stated on their effectiveness/confidence to limit or reduce *Salmonella*/HEV occurrence in the pig production chain, preferably by peer-reviewed articles, by our explorative studies or alternatively by the expert panel or by results of the machine learning (noted in the database structure of BIOPIGEE's catalogue of biosecurity measures). The benchmark system will consider different production stages and European regions.
The result of WP5 will be incorporated into the development of an interface tool offered to veterinarians/consultants/farmers (T6.2) and be disseminated to stakeholders at a final workshop in WP6 (T6.3).

Deliverables

Ref	Title	Due month
D-JRP21-WP5.21	Benchmark system for effectiveness of biosecurity practice finished and forwarded to WP1 and WP6	M58

Milestones

Ref	Title	Due month
M-JRP21-25	Finalized data integration from WP2-4 into catalogue of biosecurity measures	M56
M-JRP21-26	Finalized literature review/meta-analysis	M50
M-JRP21-28	Predicted effectiveness of specific biosecurity measures from machine learning approach incorporated in catalogue	M57
M-JRP21-29	Expert panel ranked biosecurity practice	M51
M-JRP21-32	Benchmark system for effectiveness/relevance of biosecurity practice finished	M58

Objectives

- To produce dissemination material on best biosecurity practices to reduce the presence of *Salmonella* and hepatitis E virus in pigs, at farm level and along the food chain.
- To develop a support tool for calculating cost effectiveness of biosecurity related interventions.
- To organise a workshop series to enable exchange between researchers and stakeholders on biosecurity in pig production

Description of work:

WP: JRP21-WP6 Dissemination

WP start month: M25

WP end month: M60

WP Leader Marie Sjölund, SVA

Deputy WP Leader BfR

WP participants SVA, BfR, AGES (VMU), APHA

Description of the WP:

Project results will be made available to students, farmers, veterinarians and the food industry through a number of tools and activities: Results will be presented and supplied as education and information material as well as through user-friendly interfaces on relevant existing websites. A support tool (Excel) to calculate cost effectiveness of interventions will be developed. A workshop-series will be organised to connect researchers and stakeholders “from farm to fork” in order to extract, discuss, inform about and rate country-specific biosecurity practices.
Collaboration with stakeholders in BIOPIGEE will build on previous activities and collaborations in the field of biosecurity. Building on these collaborations, knowledge and experience available in the field of biosecurity on the prevalence of *Salmonella* and hepatitis E virus will be gathered and shared. Furthermore, these established collaborations will be used to disseminate the outcomes of BIOPIGEE to the stakeholders and have impact on the policy level.
Building on these collaborations, available data will be collected and new data retrieved on the prevalence of *Salmonella* and hepatitis E virus in pig production in several countries, as well as on the knowledge and experience available in the field of biosecurity on a general level, and more specifically for the two pathogens addressed.

Task JRP21-WP6-T1: Assembly and development of biosecurity information

Task start month: M25

Task end month: M60

Task Leader: APHA

Deputy Task Leader: AGES

Task Participants: SVA, BfR, AGES, APHA

Description of the task: Results from WP2-5 will be provided by the respective work packages to WP6 to be assembled and further adopted for publishing. The results will be made available for farming schools through engaging and easy readable education material. Moreover, the results will also be made available in a user-friendly interface on already existing websites of the One Health EJP, BIOPIGEE partners and relevant stakeholders such as associations of pig producers and veterinarians, authorities, educational bodies and companies along the food chain.

Sub-Task JRP21-WP6-T1-ST1 Identification of appropriate websites or other online channels

Sub-Task start month: M25

Sub-Task end month: M60

Sub-Task Leader: SVA

Deputy Sub-Task Leader: APHA

Sub-Task Participants: APHA, SVA, BfR, AGES (VMU)

Description of the sub-task: Already existing websites of partner organisations and interested relevant stakeholders such as associations of previously identified pig producers and veterinarians, authorities, educational bodies and companies along the food chain will be used to publish project results to reach out most efficiently. Both passive and active observations will be conducted throughout the project period to identify the at the time most appropriate organisations including their websites.

Sub-Task JRP21-WP6-T1-ST2a Provision of information for farming schools and websites

Sub-Task start month: M31

Sub-Task end month: M58

Sub-Task Leader: BfR

Deputy Sub-Task Leader: APHA

Sub-Task Participants: APHA, SVA, BfR, AGES (VMU)

Description of the sub-task: Relevant information material such as pictures of examples of good biosecurity practices will continuously be collected in WP2 (T2.4), forwarded to WP6 (sT6.1.2) and here be supplemented by existing and available material gathered from BIOPIGEE participants and cooperation partners. Information material (e.g. pictures) will be assembled, discussed with animal health services, training institutions and farming schools, and complemented with short messages by sT6.1.2 for dissemination towards e.g. farming schools at the end of the project. The material will also be available for the use on websites and be offered to relevant collaboration partners of BIOPIGEE participants.

Task JRP21-WP6-T2: A support tool for calculating cost effectiveness

Task start month: M49

Task end month: M60

Task Leader: AGES (VMU)

Deputy Task Leader: -

Task Participants: APHA, SVA, BfR, AGES (VMU)

Description of the task 6.2: The assessments and information of the WP 4.1. and 4.2 and knowledge collected in the catalogue of biosecurity measures will be incorporated in a user-friendly interface tool such as an Excel file, which will allow the user to calculate the cost-effectiveness of the best identified practices to reduce the risk of the foodborne pathogen *Salmonella* along the food supply chain. Depending on available information for hepatitis E virus, such a tool can also be developed to be used for calculating the cost-effectiveness of relevant biosecurity practices to reduce the risk of hepatitis E virus along the food supply chain. These tools will be based on data from Member State (MS) institutes participating in WP4. As the tool(s) are based on equations, other MS can incorporate their own data to assess cost-effectiveness both individually per MS and across Europe, depending on the chosen prevalence, food supply chain stage, demographical data, prices fluctuation and period. The user can choose different assessments methods (described in WP 4.2) depending on their needs. A description of the different methods, assumptions and a glossary of definitions of terms will be included in the user-friendly interface. This tool will assist public authorities and private industry in the planning and the implementation of cost-effective and efficient interventions to prevent emerging zoonotic pathogens, in particular *Salmonella* and hepatitis E virus.

Task JRP21-WP6-T3: Organisation of a workshop-series

Task start month 25

Task end month 58

Task Leader: BfR

Deputy Task Leader: SVA

Task Participants: APHA, SVA, BfR, AGES (VMU)

Description of the task 6.3: Workshops will be organised to connect researchers and stakeholders in a farm-to-fork fashion to discuss and rate specific biosecurity measures and inform about obtained results. Two workshops will be co-organised by SVA and BfR. One workshop will be conducted as an online digital event where preliminary data will be presented to and discussed with the expert panel from T5.4. The second workshop is planned as a physical meeting in conjunction to a relevant conference such as the One Health EJP ASM, SafePork or the European Symposium of Porcine Health Management. In this workshop, results from the BIOPIGEE project will be presented to researchers and stakeholders representing all regions in Europe and views on appropriate practices will be shared. Care will be taken to encompass participants from the different stages of the food chain from farm to fork. We seek to:

- extract and discuss country-specific biosecurity practices
- conduct an expert rating of biosecurity measures
- evaluate on the actors' responsibility of *Salmonella*-infection regarding the stages of the food chain
- inform stakeholders (results of WP2-4)

Sub-Task JRP21-WP6-T3-ST1 Identification of relevant stakeholders

Sub-Task start month: M25

Sub-Task end month: M58

Sub-Task Leader: BfR

Deputy Sub-Task Leader: SVA

Sub-Task Participants: APHA, SVA, BfR, AGES (VMU)

Description of the sub-task: The identification process will be carried out continuously to reach out to the at the time most relevant stakeholders of pig producers and veterinarians, authorities, educational bodies and companies along the food chain. This process will shift from being an active process at times to a more passive process of observations performed during everyday work and contact with stakeholders.

Sub-Task JRP21-WP6-T3-ST5 Organisation of Workshop 3

Sub-Task start month: M49

Sub-Task end month: M58

Sub-Task Leader: BfR

Deputy Sub-Task Leader: SVA

Sub-Task Participants: APHA, SVA, BfR, AGES

Description of the sub-task: The third and last workshop will be organised to present results from the entire project to relevant stakeholders.

Deliverables

Ref	Title	Due month
D-JRP21WP6.22	Provision of information on best biosecurity practice to farming schools	M58
D-JRP21-WP6.24	Project web-content developed	M60
D-JRP21-WP6.25	A support tool (Excel) for calculation of cost effectiveness of preventive biosecurity measures developed	M60
D-JRP21-WP6.26	Workshop 3 completed	M58
D-JRP21-WP6.27	Provision of biosecurity protocol and of benchmark of biosecurity practice	M60

Milestones

Ref	Title	Due month
M-JRP21-30	Information on best biosecurity practice to farming schools ready to be provided	M58
M-JRP21-31	Relevant stakeholders re-identified	M58

M-JRP21-34	The Excel support tool for cost effectiveness calculations distributed	M60
M-JRP21-35	Workshop 3 completed	M58
M-JRP21-36	Project web-content disseminated online	M60

2.4.1.1.18 JRP22-R2-FBZ4.1-TOXOSOURCES

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ 2.3**			
Research Project Title	***Toxoplasma gondii* sources quantified**			
Research Project Acronym	**TOXOSOURCES**			
Leading Organisation	**P13-SSI**	Deputy Leading Organisation	**P30-RIVM**	
Project Leader	**Pikka Jokelainen**	Deputy Project leader	**Joke van der Giessen**	
Project Start month	**M25**	Project End month	**M60**	

Annual period of the OHEJP the work plan applies: Y5

Participant	**1**	2	4	6	**7**	**8**	**9**	**10**	**11**	**12**
	Anses	Ages	Sciensano	NDRVMI	**SZU**	**VRI**	**BfR**	**FLI**	**RKI**	**DTU**
PM	**9,70**				**3,15**	**5,00**	**3,70**	**4,50**	**0,40**	**0,60**
Participant	**13**	14	15	16	**17**	18	19	20	21	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	IP	APHA	PHE
PM	**6,65**				**5,40**					
Participant	**23**	24	25	26	**27**	28	29	**30**	**31**	**32**
	UoS	OKI	NUIG	TEAGASC	**ISS**	IZSAM	IZSLER	**RIVM**	**WbvR**	**FHI**
PM	**2,00**				**9,50**			**4,32**	**0,60**	**1,09**
Participant	**33**	**34**	**35**	**36**	37	**39**	40	**41**	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	**SLV**	FOHM	**SVA**	NMVRVI	ISCIII
PM	**1,17**	**3,40**	**5,80**	**0,80**		**1,00**		**0,00**		
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- ✓ TOXOSOURCES yields the first quantitative and comparable estimates of contribution of the different sources for the four regions within Europe (WP2). Moreover, TOXOSOURCES yields an overview of consumption habits that are also relevant for other foodborne pathogens (WP2, WP3). TOXOSOURCES addresses geographical differences in the epidemiology of *T.*

gondii, in animals, humans and the environment (WP2, WP3, WP4, WP5). The consortium has excellent geographical balance within Europe for multicentre studies, and external partners from China add to the global trade aspect. The work includes collaboration with the food production and retail sectors (WP2, WP3, Interest Group).

- ✓ TOXOSOURCES will develop a novel serological method that specifically explores detection of infections caused by the oocysts (WP4) in Europe, and a novel NGS-MLST typing method that can detect within-genotype patterns that are important for understanding transmission routes (WP5). The latter will be a tool for source tracing, and improves preparedness to identify outbreaks and imported emerging atypical strains. The development processes will make optimal use of existing sample collections from suitable epidemiological frameworks.

- ✓ TOXOSOURCES consortium is very well aware of research that has been done previously in this field. Emphasis is put on complementarity, avoiding redundancy and overlap, and on impact, measurably advancing the knowledge on this major zoonotic pathogen. The results from the different approaches are integrated and compared to yield robust new information that is of importance to the Key EU Stakeholders and will contribute to the development of innovative and effective interventions at national, regional, European and global levels (WP1)

Description of work

The work is organized into 5 work packages (WPs) with tasks (T) and some subtasks (sT). The project spans over three Annual Periods (Y3-Y5) and is described in three Work Plans.

JRP-TOXOSOURCES-WP1 Coordination and impact

WP start month M25 - WP end month M60
WP Leader Pikka Jokelainen, SSI; Deputy WP Leader Joke van der Giessen, RIVM
WP participants SSI, RIVM, ISS, FLI, BfR, RKI, UCM, ANSES, PIWET, DTU, FHI, INIAV, INSA, NVI, SLV, SVA, SZÚ, UoS, VRI, WBVR, BIOR, CVRL, NMBU, BRCT/NRCT, AUTh, UASVMCN, HZAU, JLU
WP1 takes place over the first, the second and the third year of the project. WP1 works closely with all the WPs of the project. Objectives of WP1:

- To manage and coordinate the project.
- To draft and implement the Data Management Plan for TOXOSOURCES.
- To integrate all the results to contribute to developing interventions.
- To ensure the results will be useful (dissemination).

WP1 manages the project and is responsible for its progress, and integrates all the results of the project to make them useful, in particular to contribute to developing interventions.
WP1 ensures the project adheres to H2020 rules regarding e.g. ethics, IRP, dissemination and publication. Moreover, WP1 is responsible for the Data Management Plan of the project. WP1 coordinates the compiling of deliverables and reports and their timely submission to the Support Team, as well as the organizing of project meetings and communication. Science-to-policy translation and efficient dissemination are emphasized to maximize the impact. Interest Group facilitates targeted dissemination to stakeholders. During Y5, the main focus of WP1 is ensuring the project reaches its goals, organizing the Final Meeting, and timely submission of the final reporting, including final Data Management Plan, reports to OHEJP, and summary of key outcomes to the Interest Group.

JRP-TOXOSOURCES-WP1-T1 Management, coordination and communication
Task start month M25 - Task end month M60
Task Leader: Pikka Jokelainen, SSI; Deputy Task Leader: Joke van der Giessen, RIVM
Task Participants: SSI, RIVM, ISS, FLI, BfR, RKI, UCM, ANSES, PIWET, DTU, FHI, INIAV, INSA, NVI, SLV, SVA, SZÚ, UoS, VRI, WBVR, BIOR, CVRL, NMBU, BRCT/NRCT, AUTh, UASVMCN, HZAU, JLU

WP1-T1 takes place over the first, the second and the third year of the project.
Coordination and management of the project. Coordination of compiling of deliverables and reports and their timely submission to the Support Team. Ensuring that the project adheres to H2020 rules regarding e.g. ethics, dissemination and publication. Coordination of organizing project meetings: during Y5: Final Meeting (FM), which may be divided in two parts. Communication within the consortium: teleconference of the WP Leaders and WP Co-Leaders (monthly), email correspondence with the WP Leaders and the whole Consortium. Dialogue with the Interest Group is continued. Sustainability of the Consortium is a main focus in Y5.

JRP-TOXOSOURCES-WP1-T2 Integration of all results to contribute to developing interventions, dissemination
Task start month M37 - Task end month M60
Task Leader: Pikka Jokelainen, SSI; Deputy Task Leader: Joke van der Giessen, RIVM
Task Participants: SSI, RIVM, ISS, FLI, BfR, RKI, UCM, ANSES, PIWET, DTU, FHI, INIAV, INSA, NVI, SLV, SVA, SZÚ, UoS, VRI, WBVR, BIOR, CVRL, NMBU, BRCT/NRCT, AUTh, UASVMCN, HZAU, JLU
WP1-T2 takes places over the second and the third year of the project. Integration of all results to contribute to developing interventions and to provide recommendations to risk managers. Efficient dissemination and science-to-policy activities at national, European and global levels continue. Key events to disseminate the results will be evaluated at the start of the year, and they include at least Annual Scientific Meeting of One Health EJP (OHEJP ASM 2022), the 2nd Environmental Toxoplasma Workshop, International Congress of Toxoplasmosis XVI, and International Congress of Parasitology (ICOPA XV).

JRP-TOXOSOURCES-WP2 Multicentre quantitative microbiological risk assessment for *T. gondii* infections
WP start month M25 - WP end month M60
WP Leader: Marieke Opsteegh, RIVM; Deputy WP Leader: Sara Monteiro Pires, DTU
WP participants: SSI, RIVM, ISS, FLI, BfR, RKI, UCM, ANSES, PIWET, DTU, FHI, INIAV, INSA, NVI, SLV, SVA, SZÚ, UoS, VRI, WBVR, UASMVCN
WP2 takes place over the first (Y3), the second (Y4) and the third year (Y5). WP2 works closely with WP1 and WP3. Objectives of WP2:

- To estimate the relative contribution of food and environmental transmission routes (T1)
- To provide an overview of the prevalence in food animals and cats (T2)
- To quantify human exposure to possible sources of infection (T3)
- To provide an overview of the processing parameters for relevant meat products (T4)
- To provide an overview of prevalence and risk factors of human infection (T5)

WP2 estimates the relative contribution of different sources of *T. gondii* infection by quantitative microbiological risk assessment (QMRA). QMRA models for infection via tissue cysts (meat) and oocysts (fruits, vegetables and environmental pathways) will be developed and applied for several countries representing all four regions of Europe. During Y5, the main focus is finalising the QMRA modelling with sensitivity and scenario analysis, and integration and reporting of all results. Regarding human infections, population attributable fractions will be calculated for countries that are included in the QMRA and have suitable risk factor studies available.

JRP-TOXOSOURCES-WP2-T1 QMRA modelling for human *T. gondii* infections
Task start month M25 - Task end month M60
Task Leader: Arno Swart, RIVM; Deputy Task Leader: Jakob Ottoson, SLV
Task Participants: SSI, RIVM, FLI, BfR, RKI, UCM, ANSES, PIWET, DTU, FHI, INIAV, INSA, NVI, SLV, SZÚ, VRI

WP2-T1 takes place over the first, the second and the third year of the project. During Y5, the main focus is to obtain and report the final results from the base model, scenarios and sensitivity analyses. This will result in country-specific estimates of the most important sources of *T. gondii* infection, including food products and environmental transmission. QMRA results will be compared between countries and discussed in comparison to prevalence and risk factor estimates (WP2-T5). Identified knowledge gaps will be ranked as research priorities based on the sensitivity and scenario analyses.

JRP-TOXOSOURCES-WP2-T5 Review of prevalence and risk factors for human *T. gondii* infection
Task start month M25 - Task end month M60
Task Leader: Ingrid Friesema, RIVM; Deputy Task Leader: Lasse S. Vestergaard, SSI
Task Participants: SSI, RIVM, RKI, UCM, ANSES, PIWET, FHI, INSA, SVA, SZÚ, UoS
WP2-T5 takes place over the first, the second and the third year of the project. During Y5, the main focus is to report results and compare data to the total predicted number of infections from the QMRA model (WP2-T1) as model validation. For countries included in the QMRA with suitable risk factor studies available, we will use the odds-ratios in combination with the prevalence of exposure from WP2-T3, to calculate population attributable fractions (PAFs).

JRP-TOXOSOURCES-WP3 Multicentre survey to fill the key existing gap: role of fresh produce (i.e. Ready-to-Eat salads)
WP start month M25 - WP end month M60
WP Leader: Marco Lalle, ISS; Deputy WP Leader: Anne Mayer-Scholl, BfR
WP participants: ISS, BfR, UCM, UoS, VRI, RIVM, NVI, PIWET, INIAV, ANSES, SSI, UCM, ISS, BIOR, AUTH, NMBU
WP3 takes place over the first, the second and the third year of the project. WP3 works closely with WP1, WP2 and WP5. Objectives of TOXOSOURCES WP3:

- To identify and assess the most appropriate procedure to detect *T. gondii* oocysts in fresh produce.
- To provide an overview of *T. gondii* oocysts in fresh produce and the environment.
- To conduct a risk-based pilot study based on available prevalence data (literature review), data on food production chains, EU trade patterns of selected fresh produce and available consumption data (WP2).
- To evaluate *T. gondii* oocyst contamination in selected fresh produce commodities by a multicentre pilot survey in representative EU regions.

WP3 aims to fill the knowledge gap concerning the relevance of fresh produce contamination by *T. gondii* oocysts as an infection source for humans. WP3 selects the most reliable methods for the molecular detection of *T. gondii* oocysts in fresh produce (i.e. vegetables, fruits and fruit juice) using a literature review and experimental evaluation through inter-laboratory comparison. Harmonised detection method(s) are implemented among the partners of WP3 by providing a standard operating procedure (SOP) and video tutorials. During Y5, WP3 will complete the multicentre survey and provide data on *T. gondii* oocyst contamination of selected fresh produce.

JRP-TOXOSOURCES-WP3-T3 Multicentre pilot survey on *T. gondii* in fresh produce in Europe
Task start month M40 - Task end month M60
Task Leader: Nadja Bier, BfR; Deputy Task Leader: Marco Lalle, ISS
Task Participants: ISS, BfR, UCM, UoS, VRI, NVI, PIWET, BIOR, INIAV, ANSES, SSI, AUTh
JRP-TOXOSOURCES-WP3-T3 takes place over the second and third year of the project. The multicentre pilot survey is completed. The results are collected and statistically analysed. Data reporting is done at European level and, where feasible, at regional level. The results are disseminated together with WP1, with special focus on the Interest Group.

JRP-TOXOSOURCES-WP4 Serology method based on novel antigens to discriminate *T. gondii* infections acquired from oocysts

WP start month M25 - WP end month M60

WP Leader: Furio Spano, ISS; Deputy WP Leader: Frank Seeber, RKI

WP participants: ISS, RKI, UCM, NVI, RIVM, SSI, ANSES, FLI, PIWET, INIAV, WBVR, INSA, VRI, BIOR, HZAU, JLU

WP4 takes place over the first, the second and the third year of the project. Objectives of WP4:

- To identify *T. gondii* antigens with source-attributing potential (proteins of interest, POIs)
- To explore serological methods that discriminate oocyst- from tissue cyst-driven infections
- To estimate the prevalence of oocyst-driven infections in humans and animals

WP4 identifies novel antigens of *T. gondii* that have source-attributing potential and explores serological methods able to discriminate between oocyst- vs. tissue cyst-driven infections. During Y5, the main focus of WP4 is the inter-laboratory validation of the source attributing method developed in WP4-T2 and the exploration of this novel serological assay to assess the prevalence of oocyst-derived infections in animals and in humans.

JRP-TOXOSOURCES-WP4-T1 Identification and production of *T. gondii* stage-specific antigens for source attribution

Task start month M25 - Task end month M60

Task Leader: Furio Spano, ISS; Deputy Task Leader: Frank Seeber, RKI

Task Participants: ISS, RKI, FLI

WP4-T1 takes place over the first, the second and the third year of the project. In Y5, additional POIs will be produced, and the work on an antibody profiling is continued.

JRP-TOXOSOURCES-WP4-T2 Development of a novel stage-specific antigen-based ELISA to diagnose oocyst- and bradyzoite-driven *T. gondii* infections

Task start month M29 - Task end month M60

Task Leader: Gema Álvarez-Garcia, UCM; Deputy Task Leader: Luis Ortega Mora, UCM

Task Participants: UCM, ANSES, VRI, PIWET, RIVM, SSI

WP4-T2 takes place over the first, the second year and the third year of the project. Work continues, and additional POIs from WP4T1 are assessed using the step-by-step validation process.

JRP-TOXOSOURCES-WP4-T2-sT1 Standardization of a POI-based ELISA to diagnose oocyst- and/or bradyzoite driven *T. gondii* infections using reference pig sera

Sub-Task Leader: Gema Álvarez-Garcia, UCM

Sub-Task Participants: ANSES, VRI, PIWET

Work continues.

JRP-TOXOSOURCES-WP4-T2-sT2 Validation of a novel stage-specific antigen based ELISA to diagnose oocyst- and/or bradyzoite-driven *T. gondii* infections using reference sera from several relevant host species including humans

Sub-Task Leader: Luis Ortega Mora, UCM

Sub-Task Participants: ANSES, RIVM, SSI

Work continues.

JRP-TOXOSOURCES-WP4-T3 Exploring the prevalence of oocyst-derived *T. gondii* infections in animals and in humans

Task start month M40 - Task end month M60

Task Leader: Rebecca Davidson, NVI; Deputy WP Leader: Radu Blaga, ANSES

Task Participants: NVI, ANSES, PIWET, SSI, BRCT, RIVM, INIAV, WBVR, VRI, BIOR, INSA

WP4-T3 takes place over the second and third year of the project. This task aims at improving our understanding of *T. gondii* oocyst transmission to domestic and game animals used for human consumption as well as humans in Europe. Different management and breeding systems are known to affect the prevalence of *T. gondii* in domestic animals, and seroprevalence differs substantially by geographical region in game animals. Likewise, *T. gondii* prevalence in humans is affected by factors including geographical setting and consumption habits. Using the novel and specific sporozoite/bradyzoite recombinant antigens produced in WP4-T1 and validated in WP4-T2, we will conduct a ring trial/proficiency test to confirm the reproducibly of the results in different laboratories. Next, the robustness of the specific antigens will be tested in pilot studies using panels of sera from naturally *T. gondii* infected animals and humans, from different regions.

JRP-TOXOSOURCES-WP4-T3-sT1 Inter-laboratory validation of the POI-based ELISA

Sub-Task Leader: Rebecca Davidson, NVI

Sub-Task participants: NVI, ANSES, PIWET, SSI, RIVM, INSA, BRCT

An ELISA based on one or several selected sporozoite/bradyzoite recombinant antigens will be adapted to the different participating laboratories in order to obtain comparable results. Interlaboratory reproducibility and analytical sensitivity will then be evaluated using a reduced panel of positive and negative reference sera (experimental *T. gondii* infection) identified in WP4-T2-sT1.

JRP-TOXOSOURCES-WP4-T3-sT2 Exploring the prevalence of oocyst-driven infections in domestic animals (pigs, small ruminants) and wildlife (wild boar, wild ungulates) used for human consumption

Sub-Task Leader: Radu Blaga, ANSES

Sub-Task participants: ANSES, NVI, PIWET, INIAV, WBVR, VRI, BIOR, SSI

To reveal differences in the relative prevalence of oocyst-driven infections between animal species, regions and management systems, available *T. gondii* -positive sera from natural infections from different parts of Europe will be analysed using the standardised ELISA test developed in WP4-T2. A suitable panel of sera for relevant animal species, e.g. from domestic pigs (indoor & outdoor production systems), wild boars, small ruminants (sheep, goats) and/or wild ungulates will be tested. Subsequently, the validated test will be offered to other laboratories in the consortium for implementation and testing of existing collections of positive sera.

JRP-TOXOSOURCES-WP4-T3-sT3 Exploring the prevalence of oocyst-driven infections in humans

Sub-Task Leader: Henrik Vedel Nielsen, SSI

Sub-Task participants: SSI, RIVM, INSA, BRCT/NRCT

T. gondii positive human sera from natural infections available from existing sample collections from different parts of Europe will be tested using the method developed in WP4-T2. The sera will be also tested using a panel of routine diagnostic serological tests to prove infection, as needed. The work will consist of pilot studies conducted depending on the availability of suitable sera. One of the

planned pilot studies will be performed in case there are any detected *T. gondii* outbreaks in Europe, where human sera can be collected.

JRP-TOXOSOURCES-WP5 Novel *T. gondii* typing method to detect within-genotype variation
WP start month M25 - WP end month M60
WP Leader: Gereon Schares, FLI; Deputy WP Leader: Simone Caccio, ISS
WP participants ANSES, BIOR, FLI, ISS, NVI, PIWET, RIVM, SSI, UCM, VRI, SZÚ/NIPH, HZAU, JLU
WP5 takes place over the first, second and the third year of the project. Objectives of WP5:

- To develop a novel *T. gondii* typing method with the discriminatory power needed in Europe
- To apply the novel method in pilot studies

WP5 aims to identify highly polymorphic regions in genomes of very closely related *T. gondii* strains across Europe. Preliminary NGS data on European Type II *T. gondii*, obtained in EURLP/ISS-FLI collaboration revealed substantial variation between isolates and relative to reference strains. Using a panel of representative strains, regions in the genome with an optimal SNP density are identified and used to establish a novel high-throughput targeted NGS-MLST-typing method.

JRP-TOXOSOURCES-WP5-T3 Inter-laboratory comparison and NGS-MLST pilot studies
Task start month M41 - Task end month M60
Task Leader: Luis Ortega-Mora, UCM; Deputy Task Leader: Pikka Jokelainen, ISS
Task Participants: ANSES, BIOR, FLI, ISS, NVI, PIWET, RIVM, SSI, UCM, VRI, SZÚ/NIPH, HZAU, JLU
WP5-T3 takes place over the second and third year of the project. After the inter-laboratory comparison of the established novel NGS-MLST genotyping method, the method is applied in pilot studies on ”real/unknown“ *T. gondii* positive samples from the field. Pilot studies are planned and designed based on availability of suitable isolates/DNAs/samples, collected in WP5-T1, and the applicability of the method to different matrices, as tested in WP5-T2. The aim is to apply the method to samples from intermediate hosts, definitive hosts, and environment.

JRP-TOXOSOURCES-WP5-T3-sT2 Pilot studies using novel NGS-MLST method
Sub-Task start month: M49 - Sub-Task end month: M60
Sub-Task Leader: Gereon Schares, FLI; Deputy Sub-Task Leader: Pikka Jokelainen, SSI
Sub-Task Participants: FLI, SSI, UCM, selected other partners
Pilot studies are conducted based on availability of suitable samples. The aim is that at least one of the pilot studies includes samples from different regions or areas, at a suitable scale. At least one of the three pilot studies will concentrate on focal sample collections (i.e. country specific sample collections) to test the resolution of the method to differentiate between local strains. One of the pilot studies will comprise of or include any positive samples from WP3. This task will contribute to investigating geographical differences as well as role of environment in epidemiology of *T. gondii*.

Deliverables

Ref	Title	Due month
D-JRP-TOXOSOURCES-WP1.2	Final reports	M60
D-JRP-TOXOSOURCES-WP2.3	Report on regional variation of prevalence and risk factors of human *T. gondii* infection within Europe	M59
D-JRP-TOXOSOURCES-WP2.4	Report on relative contribution of different sources and routes of exposure by country/region	M59

D-JRP-TOXOSOURCES-WP3.5	Report on occurrence of *T. gondii* in selected fresh produce in different regions in Europe	M59
D-JRP-TOXOSOURCES-WP4.2	Report on the prevalence of oocyst-derived infections in humans and animals (including testing of robustness, the ring trial, and the pilot studies of WP4)	M59
D-JRP-TOXOSOURCES-WP5.3	Report on the inter-laboratory comparison and the pilot studies of WP5	M59
Milestones		
Ref	Title	Due month
M-JRP-TOXOSOURCES-20	Final Meeting held by WP1	M60

2.4.1.1.19 JRP23-R2-FBZSH5-ADONIS

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ-SH 5: Determinants of the reversal of the decreasing trend in Salmonella incidence in humans and poultry in the EU**									
Research Project Title	**Assessing Determinants Of the Non decreasing Incidence of *Salmonella***									
Research Project Acronym	**ADONIS**									
Leading Organisation	**P30-RIVM**				Deputy Leading Organisation			**P34-PIWET**		
Project Leader	**Eelco FRANZ**				Deputy Project leader			**Dariusz WASYL**		
Project Start month	**M25**				Project End month			**M60**		
Annual period of the OHEJP the work plan applies: Y5										
Participant	**1**	**2**	**4**	6	7	8	9	10	11	12
	Anses	**Ages**	**Sciensano**	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM	**4,20**	**1,30**	**7,96**							
Participant	**13**	14	15	16	**17**	18	19	**20**	**21**	**22**
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	**IP**	**APHA**	**PHE**
PM	**9,00**				**6,00**			**4,20**	**6,08**	**0,75**
Participant	23	24	25	26	**27**	28	29	**30**	**31**	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	IZSAM	IZSLER	**RIVM**	**WbvR**	FHI
PM					**2,20**			**10,02**	**2,82**	
Participant	33	**34**	**35**	**36**	37	39	40	41	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM		**4,50**	**4,95**	**9,33**						
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- to facilitate partners' cooperation and WP integration
- to guarantee timely delivery of periodic reports
- to accumulate, communicate and disseminate project outcomes

Description of work
JPR26-WP1 Project management
WP start month: 25
WP end month: 54
WP Leader: Eelco FRANZ (RIVM)
Deputy WP Leader: Dariusz WASYL (PIWET)
WP participants: ANSES, Sciensano, SSI, UCM, IP, RIVM, PIWET

Description of the WP:
WP1 takes place over the first, the second and the third year of the project. It is led by projects leaders supported by WPs leaders and deputies. It facilitates and cumulates all the efforts taken within other WPs, summarises and reports the outcomes to OHEJP management team, aligns and communicates to other OHEJP research and integrative activities, and disseminates the conclusions beyond OHEJP.
WP1 consists of two tasks ongoing throughout the project period. Since task 1 governs internal issues of the ADONIS consortium, task 2 is orientated to external partners and stakeholders.

JPR23-WP1-T1 Coordination
Task Leader: Eelco FRANZ (RIVM)
For fluent communication, planning and results sharing between partners and WPs three physical meetings and regular teleconferences are organised for the entire consortium, WPs leaders/deputies or given WP partners, depending on the issue.
Y5 Final meeting and satellite teleconferences are organised in the final phase to wrap up and conclude on project outcomes.

JPR23-WP1-T2 Aligning and communication
Task Leader: Eelco FRANZ (RIVM)
T2 consists of two subtasks.

JPR23-WP1-T2-ST1 Reporting
Subtask Leader: Eelco FRANZ (RIVM)
ST1 is responsible for annular reporting to OHEJP coordinator.
Annual report for Y4 is prepared.

JPR23-WP1-T2-ST2 Alignment and communication
Subtask Leader: Dariusz WASYL (PIWET)
ST2 is responsible for aligment and communication with other OHEJP activities and stakeholders.
The findings and conclusions of the project are communicated and disseminated to relevant OHEJP activities and stakeholders.

JPR26-WP2 *Salmonella* controls at the primary production level
WP start month 25
WP end month 54
WP Leader Michel-Yves MISTOU (ANSES)
Deputy WP Leader Julio ALVAREZ SANCHEZ (VISAVET-UCM)
WP participants ANSES, APHA, PIWET, VISAVET-UCM, WVBR

JPR23-WP2-T3 Improvement of *Salmonella* controls and management measures
Task start month 49
Task end month 54
Task Leader: Michel-Yves MISTOU (ANSES)

Deputy task Leader: Dariusz Wasyl (PIWET)
Task Participants: ANSES, APHA, PIWET, VISAVET-UCM, WVBR

Based on the outcome of T2.1 and T2.2 we will list possible elements and areas for the improvement of *Salmonella* control in poultry flocks and flock management. This will include evaluation of surveillance strategies at the flock (T2.2.ST1) but also MS level (T2.1), particularly with regards to the implementation of specific prevention and control measures (T2.2.ST2). Based on the analysis of this information a set of recommendations will be elaborated and shared with appropriate stakeholders (i.e., official veterinary services, producers, veterinarians).

JRP23-WP4 *Salmonella* Genomics
WP start month: 25
WP end month: 54
WP Leader: Eva Litrup (SSI)
Deputy WP Leader: Maria Pardos de La Gandara (IP)
WP participants: SSI, IP, RIVM, Piwet, Sciensano, WBVR, PHE, APHA, INSA, INIAV, ANSES, VISAVET, AGES, ISS
Description of the WP: continued from previous year

JRP23-WP4-T3 Phylodynamics and Phylogeography
Task start month: 31
Task end month: 51
Task Leader: Eelco Franz (RIVM)
Deputy Task Leader:
Task Participants: SSI, IP, RIVM, Piwet, Sciensano, PHE, APHA, INSA, INIAV, ANSES, VISAVET
Description of the task: continued from previous year

JRP23-WP4-T4 Mutant creation and testing including GWAS studies
Task start month: 31
Task end month: 54
Task Leader: Eva Litrup (SSI)
Deputy Task Leader Michel-Yves Mistou (ANSES)
Task Participants: SSI, IP, Piwet, Sciensano, APHA, INSA, INIAV, ANSES, ISS
Description of the task: continued from previous year
Sub-Tas GWAS studies
Sub-Task start month: 37
Sub-Task end month: 54
Sub-Task Leader: Nicolas Radomski (ANSES)
Sub-Task Participants: SSI, IP, Piwet, Sciensano, APHA, INSA, INIAV, ANSES, ISS

WP5: JRP23-WP5 MCDA model to support priority setting
WP start month 28
WP end month 52
WP Leader: Lapo Mughini-Gras (RIVM)
Deputy WP: Nino van Goethem (Sciensano)
WP participants: RIVM, WBVR, Sciensano
Description of the WP: Continued from previous year.

Task: JRP26FBZ-4-WP5-T2 MCDA modelling
Task start month 36
Task end month 52

Task Leader: Lapo Mughini-Gras (RIVM)
Deputy Task Leader: Ewa Pacholewicz (WBVR)
Task Participants: RIVM, VBWR, Sciensano
Description of the task: Continued from previous year.

Deliverables

Ref	Title	Due month
D-JRP23-WP1.3	Y4 report delivered	51
D-JRP23-WP1.4	Result dissemination plan developed	54
D-JRP23-WP4.2	List of genetic determinants associated with the change in Salmonella incidence in Europe	51
D-JRP23 WP5.2	Experts elicitation results for the assessment of weights.	50
D-JRP23 WP5.3	Outcomes of the MCDA analysis.	52

Milestones

Ref	Title	Due month
M-JRP23-16	Final meeting organised	54
M-JRP23-17	Data finalized for manuscript on Phylodynamics and Phylogeography	51
M-JRP23-18	Data finalized for manuscript on phenotypes	54
M-JRP23-19	Publication of sequence collection on European Nucleotide Archive (ENA)	54

2.4.1.1.20JRP24-R2-FBZSH9-BeONE

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZSH9**									
Research Project Title	**Building integrative tools for OneHealth Surveillance**									
Research Project Acronym	**BeONE**									
Leading Organisation	**P13-SSI**				Deputy Leading Organisation	**P30-RIVM**				
Project Leader	**Kristoffer Kiil**				Deputy Project leader	**Claudia Coipan**				
Project Start month	**M25**				Project End month	**M60**				
Annual period of the OHEJP the work plan applies: Y5										
Participant	1	2	4	6	7	8	**9**	**10**	**11**	**12**
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	**BfR**	**FLI**	**RKI**	**DTU**
PM							**6,00**	**0,30**	**0,60**	**1,50**
Participant	**13**	14	15	16	17	18	19	20	**21**	**22**
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	**PHE**
PM	**9,00**								**1,90**	**0,50**
Participant	23	24	25	26	27	**28**	29	**30**	31	**32**
	UoS	OKI	NUIG	TEAGASC	ISS	**IZSAM**	IZSLER	**RIVM**	WbvR	**FHI**
PM						**2,00**		**4,00**		**0,90**
Participant	**33**	**34**	35	**36**	37	39	40	41	42	43
	NVI	**PIWET**	INIAV	**INSA**	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM	**0,75**	**3,25**		**5,51**						
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Dashboard collaboration and analysis tool M50
- Guideline for cluster investigation using integrated data M52
- Establish method comparability M54
- Database layout for national system M54

- Successfully completed simulated outbreak trial M54
- Ad-hoc data sharing system M60
- Dashboard M60
- Framework for testing and feedback M60

Description of work

WP1: Typing comparability and nomenclature

WP start month: 25
WP end month: 54
WP Leader: Vítor Borges, INSA(36)
Deputy WP Leader: Claudia Coipan, RIVM (30)
WP participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
WP1 takes place over the the first, the second and the third year of the project
Description of the WP: continued from previous year

Task: BeONE-WP1-T3 Clustering congruence and thresholds
Task start month: 25
Task end month: 54
Task Leader: Vítor Borges, INSA (36)
Deputy Task Leader: Claudia Coipan, RIVM (30)
Task Participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T1.3 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous year

WP2: Joining molecular and epidemiological methods

WP start month: 25
WP end month: 52
WP Leader: Claudia Coipan, RIVM (30)
Deputy WP Leader: Vítor Borges, INSA (36)
WP participants: RIVM (30), INSA (36), SSI (13), PHE (22), NVI (33),RKI (11), APHA (21), PIWET (34)
WP2 takes place over the first, the second and the third year of the project.
Description of the WP: continued from previous year

Task BeONE-WP2-T3: Definition of guidelines for cluster investigation
Task start month 41
Task end month 52
Task Leader: Claudia Coipan, RIVM (30)
Deputy Task Leader : Vítor Borges, INSA (36)
Task Participants : RIVM(30), INSA(36)
T2.3 takes place over the second and third year of the project.
Description of the task:
Based on the results of WP1 and T2.2, a document will be drafted containing guidelines for implementation of the algorithm for outbreak detection and a final version of it will be prepared following feedback from the partners. A first version of procedural stepwise approach for improved cluster investigation for a target foodborne bacterium will be drafted by month 1842, based on epidemiologic and genomic data. Following the feedback from the partners in WP5 that will test the detection outbreak clustering algorithm making use of the draft guidelines, the guidelines will be refined to address potential shortcomings and unpredicted situations.

WP3: Storage, management, and sharing for meta- and molecular data

WP start month: 25
WP end month: 60
WP Leader: Carlus Deneke, BfR (09)
Deputy WP Leader: Finn Gruwier Larsen, SSI (13)
WP participants: SSI (13), NVI (33), IZSAM (28), FLI (10), RKI (11), BfR (09), DTU (12)
WP3 takes place over the first, the second and the third year of the project.
Description of the WP: continued from previous years

Task: BeOne-WP3-T2: Metadata acquisition and standardisation
Task start month 25
Task end month 54
Task Leader: Simon Tausch, BfR (09)
Deputy Task Leader: Jörg Linde, FLI (10)
Task Participants: NVI (33), FLI (10)
T3.2 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous year

Task: BeOne-WP3-T3: Database design and implementation
Task start month 25
Task end month 54
Task Leader: Finn Gruwier Larsen, SSI (13)
Deputy Task Leader: Simon Tausch, BfR (09)
Task Participants: SSI (13), BfR (09), IZSAM (28), NVI (33), DTU (12)
T3.3 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

Task: BeOne-WP3-T4: National data sharing pilot
Task start month 48
Task end month 60
Task Leader: Carlus Deneke, BfR (09)
Deputy Task Leader: Jörg Linde, FLI (10)
Task Participants: FLI (10), BfR (09), RKI (11)
T3.4 takes place over the second and the third year of the project.
Description of the task: continued from previous year

WP 4: Development of a user-oriented interface for analysis and sharing of epi and molecular data
WP start month: 1
WP end month: 30
WP Leader: Finn Gruwier Larsen, SSI (13)
Deputy WP Leader: Rolf Sommer Kaas, DTU (12)
WP participants: BfR (09), SSI (13), DTU (12)
WP4 takes place over the first, the second and the third year of the project.
Description of the WP: continued from previous years

Task: BeONE-WP4-T1 Dashboard
Task start month: 25
Task end month: 54
Task Leader: Finn Gruwier Larsen, SSI (13)
Deputy Task Leader: Simon Tausch, BfR (09)
Task Participants: BfR (09), SSI (13), DTU (12), RKI (11)
T4.1 takes place over the first, the second and the third year of the project.

Description of the task: continued from previous year

Task: BeONE-WP4-T3 Cluster analysis and collaboration tool
Task start month: 37
Task end month: 50
Task Leader: Finn Gruwier Larsen, SSI (13)
Deputy Task Leader: Carlus Deneke, BfR (09)
Task Participants: BfR (09), SSI (13), DTU (13)
T4.3 takes place over the second and third year of the project.

Description of the task:
Building upon T4.1, implement a system for saving, naming, analysing and commenting on selected clusters of samples.

Task: BeONE-WP4-T4 Data sharing front end
Task start month: 29
Task end month: 60
Task Leader: Finn Gruwier Larsen, SSI (13)
Deputy Task Leader: Simon Tausch, BfR (09)
Task Participants: BfR (09), SSI (13), DTU (12)
T4.4 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

WP5: Dissemination, Testing, Evaluation and Sustainability
WP start month: 25
WP end month: 60
WP Leader: Eva Litrup, SSI (13)
Deputy WP Leader: Claudia Coipan, RIVM (30)
WP participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
WP5 takes place over the first, the second and the third year of the project.
Description of the WP: continued from previous years

Task: BeONE-WP5-T1 Dissemination
Task start month: 25
Task end month: 60
Task Leader: Eva Litrup, SSI (13)
Deputy Task Leader: Claudia Coipan, RIVM (30)
Task Participants: SSI (13), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T5.1 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

Task: BeONE-WP5-T2 Continuous Testing and Feedback
Task start month: 25
Task end month: 60
Task Leader: Claudia Coipan, RIVM (30)
Deputy Task Leader: Eva Litrup, SSI (13)
Task Participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T5.2 takes place over the first, the second and the third year of the project.

Description of the task: continued from previous years

Task: BeONE-WP5-T3 Final evaluation
Task start month: 48
Task end month: 60
Task Leader: Eva Litrup, SSI (13)
Deputy Task Leader: Vítor Borges, INSA (36)
Task Participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T5.3 takes place over the second and third year of the project.
Description of the task: continued from previous years

Task: BeONE-WP5-T4 Sustainability
Task start month: 25
Task end month: 60
Task Leader: Claudia Coipan, RIVM (30)
Deputy Task Leader: Eva Litrup, SSI (13)
Task Participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T5.4 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

WP6: Management
WP start month: 25
WP end month: 60
WP Leader: Kristoffer, Kiil, SSI (13)
Deputy WP Leader: Vítor Borges, INSA (36)
WP participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
WP6 takes place over the first, the second and the third year of the project.
Description of the WP: continued from previous years

Task: BeONE-WP6-T1 Management
Task start month: 25
Task end month: 60
Task Leader: Kristoffer Kiil, SSI (13)
Deputy Task Leader: Vítor Borges, INSA (36)
Task Participants: SSI (13), INSA (36), RIVM (30), BfR (09), IZSAM (28), DTU (12), FLI (10), NVI (33)
T6.1 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

Task: BeONE-WP6-T2 Communication
Task start month: 25
Task end month: 60
Task Leader: Kristoffer Kiil, SSI (13)
Deputy Task Leader: Vítor Borges, INSA (36)
Task Participants: SSI (13), RKI (11), IZSAM (28), RIVM (30), Piwet (34), FLI (10), APHA (21), DTU (12), FHI (32), PHE (22), NVI (33), BfR (09), INSA (36)
T6.2 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

Task: BeONE-WP6-T3 Data Management
Task start month: 25
Task end month: 60
Task Leader: Kristoffer Kiil, SSI (13)
Deputy Task Leader: Carlus Deneke, BfR (09)
Task Participants: SSI (13), BfR (09)
T6.3 takes place over the first, the second and the third year of the project.
Description of the task: continued from previous years

Deliverables

Ref	Title	Due month
D-BeONE.2.3	Final Guidelines	52
D-BeONE.2.4	Draft manuscript on algorithm and guidelines	52
D-BeONE.1.3	Report with clustering congruence results	54
D-BeONE.5.3	Tutorial	54
D-BeONE.3.1	Report on national data sharing pilot	60
D-BeONE.4.3	Final BeONE system	60
D-BeONE.5.1	Instruction for local installation of dashboard	60
D-BeONE.5.2	Software list	60
D-BeONE.5.4	Final evaluation report	60
D-BeONE.5.5	Final sustainability document	60

Milestones

Ref	Title	Due month
M-BeONE.2.3	Definition of guidelines for cluster investigation	50
M-BeONE.3.9	Data porting from at least one further pipeline	50
M-BeONE.3.10	Expansion of the API for export functionality	50
M-BeONE.4.6	Cluster analysis and collaboration tool ready for testing	50
M-BeONE.4.7	Import/Export front end for reference databases implemented	52
M-BeONE.1.5	Clustering congruence analysis completed	54
M-BeONE.3.8	Application of the selected ontology system(s)	54
M-BeONE.3.11	Expansion of the API for queries from the dashboard	54
M-BeONE.4.8	Dashboard in workable condition for Final Evaluation workshop	54
M-BeONE.5.1	Simulated international outbreak at 3rd annual meeting	54
M-BeONE.6.2	3nd annual meeting	54
M-BeONE.4.9	BeONE data exchange system implemented	60

2.4.1.1.21 JIP03-R2-IA2.3-CARE

Reference to the Strategic Research Agenda (please refer to D2.7)	**IA 2.3: Joint databases of reference materials and data, incl. metadata.**			
Integrative Project Title	**Cross-sectoral framework for quality Assurance Resources for countries in the European Union**			
Integrative Project Acronym	**CARE**			
Leading Organisation	**P12-DTU**	Deputy Leading Organisation	**P13-SSI**	
Project Leader	**Rene Hendriksen**	Deputy Project leader	**Mia Torpdahl**	
Project Start month	**M25**	Project End month	**M60**	
Annual period of the OHEJP the work plan applies: Y5				

Participant	**1**	2	4	6	7	8	9	10	11	**12**
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	**DTU**
PM	**11,50**									**5,50**
Participant	**13**	14	15	16	**17**	18	**19**	**20**	**21**	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	**INRAE**	**IP**	**APHA**	PHE
PM	**10,00**				**6,00**		**15,90**	**4,60**	**5,37**	
Participant	23	24	25	26	**27**	**28**	**29**	**30**	**31**	32
	UoS	OKI	NUIG	TEAGASC	**ISS**	**IZSAM**	**IZSLER**	**RIVM**	**WbvR**	FHI
PM					**6,50**	**3,00**	**16,00**	**2,50**	**1,10**	
Participant	**33**	**34**	35	**36**	37	**39**	**40**	**41**	42	**43**
	NVI	**PIWET**	INIAV	**INSA**	IISPV	**SLV**	**FOHM**	**SVA**	NMVRVI	**ISCIII**
PM		**12,00**				**0,90**	**3,50**	**2,10**		**0,70**
Participant	**44**	**45**	46	47						
	BIOR	**RUOKA**	THL	NEBIH						
PM	**6,00**	**3,00**								

Objectives

- To coordinate collaboration between the public health, food and animal health sectors participating in CARE.

Description of work

WP: WP0 Project coordination
WP start month: 25
WP end month: 60
WP Leader: Rene Hendriksen, DTU
Deputy WP Leader: Mia Torpdahl, SSI
WP participants: ANSES, DTU, SSI, UCM, INRAE, IP, APHA, ISS, IZSAM, IZSLER, RIVM, WBVR, PIWET, SLV, FOHM, SVA, ISCIII, BIOR and RUOKA.
Description of the WP: WP0
The coordinator and coordinating institute, DTU will invest a large amount of time in the CARE project. The coordinator will maintain regular contacts between the 16 different partners and will be responsible for the efficient progress of the project. The coordinator will make sure that all deliverables and milestones are reached in the timeframe envisioned for the project. The coordinator will organize interactions between groups, and meetings (one annually meeting and quarterly telephonic conferences) to continuously monitor progress of the objectives and to discuss scientific advances and problems. The kick off meeting will take place at DTU, Kgs. Lyngby, Denmark, the interim meeting at ANSES, Paris, France and the closing meeting at SSI, Copenhagen, Denmark.
All partners are aware that strict management and clear lines of communication are essential to the successful completion of the proposed work programme. All partners have previously been involved in EU, ECDC, EFSA or other large consortia and are familiar with working in multi-centre, multinational projects. The partners have collaborated in different constellations with each other before and have been chosen both for their scientific credentials and proven ability to deliver in such projects. Excellent lines of communication and working relationships between all the partners have already been established. Efficient communication between partners will be achieved using electronic mail, and frequent telephone and web meetings.
Each partner will provide the coordinator with scientific and financial statements, from which the coordinator will prepare the reports (cost details, research results and technical advancements). Any problem related to the financial management of the project will be discussed.

Task: JIP IA 2.1-WP0-T1 Over-all project coordination
Task start month: M25
Task end month: M60
Task Leader: Rene Hendriksen
Deputy Task Leader: Mia Torpdahl
Task Participants: ANSES, DTU, SSI, UCM, INRAE, IP, APHA, ISS, IZSAM, IZSLER, RIVM, WBVR, PIWET, SLV, FOHM, SVA, ISCIII, BIOR and RUOKA.
Description of the task: Maintain regular contacts between the 16 different partners and monitor progress of the project through quarterly tele-conferences. Thus, to ensure that all deliverables and milestones are reached in the timeframe envisioned for the project.
Sub-Task JIP IA 2.1-WP0-T1-ST1: Organize closing meeting - 2022
Sub-Task start month: M57
Sub-Task end month: M58
Sub-Task Leader: Rene Hendriksen
Deputy Sub-Task Leader: Mia Torpdahl
Sub-Task Participants: ANSES, DTU, SSI, UCM, INRAE, IP, APHA, ISS, IZSAM, IZSLER, RIVM, WBVR, PIWET, SLV, FOHM, SVA, ISCIII, BIOR and RUOKA.

Deliverables		
Ref	Title	Due month
D.0.6	Minutes of the closing meeting - 2022	M58
D.0.7	Minutes of all tele-conferences	M57
Milestones		
Ref	Title	Due month
M.0.3	Closing meeting - 2022	M58

Objectives

To develop guidance for cross-sectoral proficiency testing, aimed at trialling the collaborative systems' ability to solve food-borne outbreaks and other trans-sectoral challenges.

Description of work

Task: **IA 2.1-WP1:** Develop of cross-sectional PT´s
WP start month: 25
WP end month: 60
WP Leader: 13 SSI, Jeppe Boel
Deputy WP Leader: 12 DTU, Rene Hendriksen

WP participants: DTU, SSI, UCM, PIWET, APHA, ISS, RIVM, WBVR, SLV, FOHM, SVA, ANSES, ISCIII, BIOR and RUOKA

Proficiency testing- (PT) or external quality assurance (EQA) schemes is an integrated part of quality assurance management for laboratories within the field of human and animal medical microbiology. The aim of this WP is to develop guidance for proficiency testing schemes that can be used cross-sectorial. This will be done by mapping the currently available PT´s and assess the usefulness of these schemes in a cross-sectorial context and by developing proposals for new PT schemes that can accommodate unmet and new needs.

The rapid emergence of whole genome DNA sequencing (WGS) methodologies for characterization of pathogens including analytical approaches that can predict virulence factors, antimicrobial resistance, clonal relationship, and identify food- and water borne outbreaks is an area where there is a need for new cross-sectorial PT schemes. Likewise, in the area of molecular based methodologies, including WGS, for culture-free detection/identification of pathogens in complex sample material new PT schemes are needed.

In order to facilitate the development of the new PT proposals the WP will include a number of well-designed pilot PT´s that will be performed among the WP participants.

The WP will be concluded by developing a final guidance document giving specific recommendations in relation to which PT´s that should be prioritized and containing specific guidance on how to perform the proposed cross-sectorial PTs.

The WP will be divided into three parts (tasks):

- Mapping of existing PT's and proposals for new PT schemes (6 months, M25-30)
- Pilot trials (organized as sub-tasks) and documentation of outcome (18 months, M31-54).
- Development of guidance document and proposals for SOPs where appropriate with suggestions for design of future cross-sectorial PT schemes (12 months, 49-60).

Task: **IA 2.1-W1-T3 Development of guidance document with suggestions for design of future cross-sectorial PT schemes (6 months).**
Task start month: 49
Task end month: 60
Task Leader: APHA, Nick Coldham
Deputy Task Leader: SSI, Jeppe Boel
Task Participants: WP participants: DTU, SSI, UCM, APHA, ISS, RIVM, WBVR, SLV, FOHM, SVA, PIWET, ANSES, ISCIII, BIOR and RUOKA.

Description of the task:
The WP will be concluded by developing a final guidance document based on the deliverables from IA 2.1-W1-T2. This document will give specific recommendations on how to perform cross-sectorial PTs, and indicate the PT´s that should be prioritized (D.1.3.1).
The document will identify those reference laboratory testing activities and laboratories where proficiency is normally required and the areas that should be prioritized as they represent the most likely threat to human and animal biosafety.
Consideration will be given to more generic aspects of WGS proficiency testing, such as DNA extraction, sequencing and bioinformatic pipelines, including bacterial speciation and phylogenetics which would be broadly applicable to the analysis of exotic or new threats. Presentation of material either as pure cultures, field samples (e.g. faeces and food) or data will be reviewed and appropriate recommendations made.
Proficiency testing of outbreak response speed will be considered and based on what has been required for recent outbreaks. The requirement for proficiency testing within a recognized standard (such as ISO17043:2010) will be taken into account within the context of normal operation of reference laboratories. This documentation will be harmonized with existing EU instructions for other (non-WGS based) proficiency testing activities e.g. the guidance document for the organisation of Proficiency Tests by NRLs for national networks, including partial outsourcing, 2019 that currently are being developed within the EURL framework.
Where appropriate, for specific proficiency testing activities, standard operating procedures SOPs will be produced (D.1.3.2) that will allow laboratories to set up proficiency testing schemes that can meet the cross-sectorial requirements. These procedures might include guidance on participation, source of reference strains, matrix for presentation, concentration, target genes or genetic markers, expected markers or determinants of success, group data analysis and selection of appropriate PT commentators. For methodologies, the guidance might include criteria for spiking levels and quality of purified DNA for molecular methods, e.g. sequencing, coverage and detection of known SNPs in reference samples The bioinformatic proficiency can be assessed through a range of markers based on for example MLST type, AMR gene or subtype (e.g. serotype for *Salmonella*) from reference strains. The reference material will be clearly identified in WP2.
The document will also identify commentators at different institutes who would be available to evaluate and comment on the data from the proficiency testing round.

Deliverables

Ref	Title	Due month
D.1.3.1	Guidance document for cross sectorial proficiency testing	M60
D.1.3.2	SOPs for specific WGS proficiency testing distributions	M60

Milestones

Ref	Title	Due month
M.1.3	Review of previous tasks (1 & 2) for the production of a guidance document for proficiency testing and SOPs for specific distributions.	M54

Objectives

- To make an inventory of current use and existence of bacterial reference materials across CARE OHEJP partner institutes, for selected, prioritised foodborne pathogens and antimicrobial resistance collections.
- To conduct a gap analysis with respect to accessibility, quality, characteristics and usefulness of existing and needed reference materials from a One Health perspective.
- To develop an approach for enrichment and adding values to the holdings.

Description of work
WP: WP2 – **Creation of EUROpanelOH**, a reference database of strains and genomes for effective quality control analysis in food safety and public health protection across sectors

WP start month: 25
WP end month: 58
WP Leader: Olivier Chesneau, IP
Deputy WP Leader: Stefano Morabito, ISS
WP participants: ANSES, DTU, UCM, INRAE, IP, ISS, IZSAM, IZSLER, WBVR, SLV, FOHM, PIWET, SVA.
Description of the WP: Bacterial reference materials (RM) are dispersed in Europe. Control strains are regularly distributed for EURLs PTs, PulseNet surveillance programs and EQAs organized by ECDC, but completeness and harmonization in providing RM for the application development and validation of analytical methods in a One Health perspective is still scanty. The need of certified RM is crucial in detail for the validation of novel methods, which is currently an active area of development, especially in the field of methods capable to identify and characterize bacterial strains on the basis of whole genome sequence (WGS) analyses. Valuable on-line resources to infer virulence and identify genetic features associated to antimicrobial resistance from WGS data are already available through several bioinformatics suites of programs, either commercially available or distributed through open web portals, such as services provided by the Center for Genomic Epidemiology at DTU (http://www.genomicepidemiology.org) or ARIES webserver hosted by EURL VTEC (https://www.iss.it/site/aries). Nevertheless, novel tools are being developed continuously for bioinformatics analysis of WGS data and there is a necessity of certified RM for their benchmarking and validation in laboratories.
The first objective of WP2 will consist of making an inventory of current use and existence of RM among CARE partners and other voluntary OH-EJP partners with a balance of leading sources according to the sector(s) of the partner: Animal, Food, Human (JIP IA 2.1-WP2-T1). Type specimens will be listed from pathotypes to phylotypes among prioritised pathogens, with a special effort made in the field of antimicrobial resistance to cover all mechanisms and track major allelic variants. Attention will be made to associate reference isolates with the corresponding genomic sequences. Redundancy will be avoided, phenotypes and genotypes will be reported, and there will be an assortment of clinically important resistance mechanisms outside the zoonotic foodborne potential, contributing to the One-Health perspective. A systematic process of gathering information that is appropriate and sufficient to develop an effective database (strains and genomes) will address the groups' needs and wants (JIP IA 2.1-WP2-T2). The database with epidemiological, phenotypic and genomic information will be organized for each selected bacterial species. A sub-database will be dedicated specifically to antimicrobial resistance mechanisms. Each CARE partner will be asked to contribute for enriching the databases by fill in the gaps through better characterization of selected isolates that will be shown of interest (JIP IA 2.1-WP2-T3). At the end of CARE and for next future developments, the EUROpanelOHwill be a curated repository of certified RM that will serve as a centralized source of challenge sets for surveillance and advancing basic science research.

Task: JIP IA 2.1-WP2-T3 Production of **additional RM** to fill in gaps and/or improve characterization if needed

Task start month: 43 (duration 16 months)
Task end month: 58
Task Leader: WBVR, Kees Veldman
Deputy Tasks Leaders: ISS, Stefano Morabito and INRAE, Michel-Yves Mistou
Task Participants: SVA, UCM, DTU, SSI, IZSLER, IZSAM, PIWET, ISS, IP, ANSES, WBVR.
Description of the task: The objective of this task will consist of coordinating the needed actions to fill the gaps identified in JIP IA 2.1-WP2-T2. In detail, identified RM could still need to be better characterized in terms of additional phenotypic traits (e.g. serologic assessment, biochemical characterization, MS spectrum, antibiotic susceptibility, cytotoxicity), or access to genome information. The sequencing approaches will depend on what is possible to do for each RM provider but high-coverage short-read data will be favoured to avoid potential complications due to errors in gene

sequences that could misinterpret a serovar or a susceptibility profile. The minimum requirement for sequencing data is that the generated raw reads and assemblies be deposited in ENA Sequence Read Archive (SRA). In these archives, the information relating to experimental workflows are captured and displayed. The availability of raw reads and assemblies will provide a pathway to re-analyse, if required, the data as newer technologies emerge. The ENA works closely together with NCBI and DDBJ as partners in the International Nucleotide Sequence Database Collaboration. The policy of INSDC is to provide free and unrestricted permanent access to all archived nucleotide data. All primary data in the INSDC belongs to the submitters and can only be updated with submitter consent. Moreover, novel RM will be added *ex novo* in the list, following the identification of their lack in the database created in JIP IA 2.1-WP2-T1 and the gaps noted in JIP IA 2.1-WP2-T2. These novel RM will need to be retrieved and fully characterized, including by WGS and mass spectrometry (MS) analyses that will constitute subtasks JIP IA 2.1-WP2-T3-ST1 and JIP IA 2.1-WP2-T3-ST2, respectively. Each participant of the JIP IA 2.1-WP2-T3 will work to fill the identified gaps. WGS data will facilitate a more complete understanding of the mechanisms of resistance and virulence, including the correlation between genotypes and phenotypes. MS data will give protein mass fingerprints of bacterial hazards useful for their detection in food and clinical microbiology. All these molecular characterization results will provide necessary passports for inclusion of needed RM in EUROpanelOH, thus feeding WP3 in a way stable over time.

Sub-Task JIP IA 2.1-WP2-T3-ST1 : WGS characterization
Sub-Task start month: 43
Sub-Task end month: 58
Sub-Task Leader: ISS, Stefano Morabito
Deputy Sub-Task Leader: DTU, Rene Hendriksen
Sub-Task Participants: SVA, UCM, SSI, IZSLER, IZSAM, PIWET, INRAE, IP, RIVM, WBVR, ANSES , ISS, DTU.
Whole genome sequencing will be applied to a selection of reference bacterial strains for which genome data will still be lacking, as identified during the gap analysis for RM needed as part of T2.2. A minimum set of basic criteria for evaluating the quality of the sequencing data produced will be applied (e.g. minimum coverage, N50 of the assembly, total base paired assembled). In detail, this sub-task will be conducted according to the recommendations and guidelines provided by EFSA program ENGAGE whose outcomes for WGS are now available (http://www.engage-europe.eu/; https://www.efsa.europa.eu/it/supporting/pub/en-1431). The raw sequencing files and the corresponding genome assemblies produced will be deposited at ENA (D2.4) and the corresponding accession numbers made available for inclusion in the RM database.

Sub-Task JIP IA 2.1-WP2-T3-ST2 : MALDI-TOF characterization
Sub-Task start month: 43
Sub-Task end month: 58
Sub-Task Leader: INRAE, Emmanuelle Helloin
Deputy Sub-Task Leader: PIWET, Małgorzata Olejnik
Sub-Task Participants: IP, ANSES, UCM, WBVR, PIWET, INRAE, SVA.
MALDI-TOF Mass spectrometry is now commonly used for bacterial identification and can also be used to find specific biomarkers. As large variations can be seen in MALDI-TOF mass spectra obtained under different conditions, the sub-task JIP IA 2.1-WP2-T3-ST2 will first consist in standardizing the way of producing reference MALDI-TOF/MS spectra by defining a Standard Operating Procedure (SOP) to ensure repeatability and reproducibility of analysis. Sub-task JIP IA 2.1-WP2-T3-ST2 participants will then produce reference spectra for the bacteria on which the project is focused. The objective is to build a database containing the reference mass spectra obtained 1) for the Reference strains defined and characterized by the project 2) for a number of other strains in the same species or, depending of the relevancy, in the same pathotype or serotype for example. The number of these supplementary strains will be adjusted depending of the number of reference spectra already existing in the commercial databases. This work will contribute to the fine characterization of the RM. The

accumulation of standardized spectra for each bacteria of interest will also generate data, which will be useful in further studies aiming at the identification of biomarkers.

Sub-Task JIP IA 2.1-WP2-T3-ST3 : Completing metadata and phenotypic data
Sub-Task start month: 43
Sub-Task end month: 58
Sub-Task Leader: WBVR, Kees Veldman
Deputy Sub-Task Leader: IP, Olivier Chesneau
Sub-Task Participants: ISS, ANSES, INRAE, SVA, UCM, DTU, SSI, IZSLER, IZSAM, PIWET, IP, WBVR.
This final part of the WP2 is intended to ensure the completion of a predefined dataset of the identified RM including metadata as well as phenotypic traits (e.g. serovar, biochemical characterization, antibiotic susceptibility).

Deliverables

Ref	Title	Due month
D.2.4	Genome assemblies and raw reads deposited at ENA	M58
D.2.5.	Spectral (MALDI-TOF) database of protein mass fingerprints	M58
D.2.6	Well-characterized RM (strains and genomes)	M58

Milestones

Ref	Title	Due month
M.2.3	Exhaustive characterization of EUROpanelOH RM	M58

Objectives

- Develop an information system (database and website) for handling the EUROpanelOH collection
- Ensure the long-term availability and sustainability of the reference material collection.

Description of work

WP: WP3 - Access and sustainability of well-defined microbial reference materials (RM)
WP start month: 25
WP end month: 54
WP Leader: Michel-Yves Mistou (INRAE)
Deputy WP Leader: Anne Brisabois (ANSES)
WP participants: ANSES, INRAE, IP, PIWET, IZSAM, SVA, SSI, WBVR, IZSLER, SLV, BIOR.
Description of the WP:
This WP seeks to make visible, accessible and sustainable the reference material well-identified and characterized in WP2 with the complete data panel associated. An information system based on a commercial solution will be developed including a web site and a searchable electronic collection catalogue (JIP IA 2.1-WP3-T1). This information system will facilitate the open access to reference strains and data for the scientific community use. Reference strains identified in WP2 will be maintained and stored in certified biological resource centers (mBRC) considered as “sustainable” (JIP IA 2.1-WP3-T2). This work should enable us to ensure the long-term availability of RMs in order to meet the needs of the European research and public health laboratories. We will foster partners to enroll in a MOOC dedicated to biobanking (JIP IA 2.1-WP3-T2), that will be followed by visits of mBRCs that should help CARE partners to update and manage their microbial collections. In a third task (JIP IA 2.1-WP3-T3), we will work toward wide dissemination and accessibility of the RMs. We aim to connect the CARE information system with data portals of existing international and solid infrastructures, to ensure maximum visibility of the reference material collection. We will try to find agreements between partners to maintain the long-term availability and updating of the reference material collection and its CARE information system.
Task: JIP IA 2.1-WP3-T1 Development of an information system for making RM more widely accessible and visible
Task start month: M25 (Duration : 11 months)

Task end month: M46
Task Leader: INRAE, Michel-Yves Mistou
Deputy Task Leader:, IZSAM, Giuseppe Aprea, PIWET Magdalena Zajac
Task Participants: INRAE, IP, DTU, PIWET, IZSLER, SSI, IZSAM, SLV, SVA, WBVR, BIOR.
Description of the task: The Task JIP IA 2.1-WP3-T1 is about the development of an information system to handle the EUROpanelOH collection. An information system (IS) will be developed to enable users to query and access RMs. It will consist of (i) a searchable electronic catalogue containing information on RMS (ii) a website. In addition, the IS will contain IT tools to support the curators and to provide users information in a structured way. A plan management data will be established. Data will be of different types including mandatory- and -not mandatory data: "passport" data, sequencing and phenotyping data, and "regulation" data for easy access in compliance with applicable legislation (Nagoya Protocol).
This portal will make reference strains available for the European academic or industrial research. Data associated with strains will be freely available through IS. This portal will be a key tool as it will allow users to access strains and relevant information *via* one entry point, avoiding time-consuming searches for necessary information on specific strains. Through CARE, a new level of interoperability between strains, metadata and databases will be obtained.
The IS must be regularly updated, upgraded and curated posing the question of its long-term sustainability (point addressed in WP3 Task3). An important achievement would be to expose the CARE catalog through the European Research Infrastructure MIRRI (Microbial Resource Research Infrastructure) webportal that would maximize its visibility.

Task: JIP IA 2.1-WP3-T2 Ensure the long-term sustainability of Reference Material collections
Task start month: 42 (Duration 15 months)
Task end month: 57
Task Leader: INRAE, Florence Valence, Michel-Yves Mistou
Deputy Task Leader: PIWET, Magdalena Zajac, IP (Dominique Clermont)
Task Participants: INRAE, PIWET, IP, ANSES, IZSLER, UCM, IZSAM, BIOR.
Description of the task:
The task JIP IA 2.1-WP3-T2 relies on microbiological work. Strains identified as reference strains (output WP2 D2.1 and D2.6) will be entered, maintained and preserved within the microbiological reference centers (mBRCs) and collections considered as sustainable. The basic missions of mBRCs are to collect, identify, characterize, conserve and disseminate strains under conditions that respect regulation and user-oriented quality standards.
In CARE, mBRCS operated by three partners (IZSLER, IP-CP, INRAE-CIRM) are certified according to ISO9001 or/and NF S 96-900 and are satisfying OECD best practices guidelines. Two partners, INRAE-CIRM and IP-CIP, are members of Word Federation for Culture Collections (WFCC) and European Culture Collections Organisation (ECCO). They are operating under quality certified procedures for the accession, the authentication, the preservation and the distribution of microorganisms. They are repositories whose role is to preserve the microorganisms and to provide them to the scientific community. They offer the guarantee of accessibility and sustainability of microbial resources hosted (Janssens et al., 2010). The Task will benefit from their expertise in the management of microbial collections. These mBRCs will train (through a MOOC and lab visits) CARE partners to update their own microbial collection, to have it certified according to quality standards and to render it sustainable. This will enrich microbial collections available for routine and reference activities across OHEJP participants (including its usage in PTs organized in WP1) and will provide them an added and sustainable value.

Task: JIP IA 2.1-WP3-T3 Ensuring the long-term accessibility of the RM collection and its existence
Task start month: 45
Task end month: 59
Task Leader: Mery Piña (IP)

Deputy Task Leader: Maria Beatrice Boniotti (IZSLER), Michel-Yves Mistou (INRAE)
Task Participants: ANSES, INRAE, IP, IZSLER, UCM, BIOR.
Description of the task: This task relies in strengthening ongoing collaborations of CARE partners with international stakeholders such as the OIE (World Organization for Animal Health), the WDCM (World Data Center for Microorganisms), MIRRI and other described below to increase the visibility and ensure the sustainability of the portal developed in task JIP IA 2.1-WP3-T1. The signature of a Memorandum of Understanding (MoUs) with the organizations listed below will guarantee the long-term accessibility of the RM collection.
The OIE is developing the Virtual Biobank portal (release planned for 2021), which will consist of a website where users can search for biological materials produced and distributed worldwide by the OIE Reference Laboratories as part of their commitment in the standardization and harmonization of diagnostic methods. Many CARE partners (ANSES, APHA, IZSAM, IZSLER, NVRI, VISAVET) are OIE Reference Laboratories and IZSLER, who leads the OIE project, is the Collaborating Centre for Veterinary Biologicals Biobank. All these CARE partners will ensure the appropriate coordination and the optimal synergy between the two projects.
The WDCM, is the data center for the WFCC, which manages several databases, including the Global Catalogue of Microorganisms (GCM). Launched in 2013, the GCM is a robust, reliable and user-friendly system to help culture collections to manage, disseminate and share the information related to their holdings. The GCM 2.0 is an international community-led project towards full genome sequencing and data annotation of microbial type strains, IP is currently a partner in this project.
In the European level, the CARE database is intended to be linked to data portals of European Research infrastructures (RI) such as MIRRI (http://mirri.org), EMBRC (http://www.embrc.eu/), BBMRI (http://www.bbmri-eric.eu/) and ELIXIR (www.elixir-europe.org), in particular with the H2020 EOSC-Life project (https://www.elixir-europe.org/news/eosc-life-start). INRA, IP and IZLER are currently working in the development of MIRRI and the conception of its “Collaborative Working Environment” to which the CARE IS could be linked.
An important aspect of the sustainability of the EUROpanelOH collection concerns the financial aspects of the maintenance of the collections (human resources, conservation costs, updating of the collection) which will require finding an economic model with the agreement of all the partners concerned and mainly the institutes hosting the mBRC.

Glossary

- ECCO: European Culture Collections Organisation
- ELIXIR: brings life science resource from across Europe. These resources include databases, software tools, training material, cloud storage and super computers.
- EMBRC: European Marine Biological Resource Centre
- EOSC: European Open Science Cloud
- ESFRI: European Strategy Forum on Research Infrastructures
- MIRRI: Microbial Resource Research Infrastructure
- OECD: Organisation for Economic Cooperation and Development
- OIE: World Organization for Animal Health
- WFCC: Word Federation for Culture Collections

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- Harper L, Campbell J, Cannon EKS et al., (2018). AgBioData consortium recommendations for sustainable genomics and genetics databases for agriculture. Database 1-32

- Janssens D, Arahal DR, Bizet C et al (2010). The role of public biological resources centers in providing a basic infrastructure for microbial research. Research in Microbiology 161, 422-429
- Wilkinson MD et al., 2016. The FAIR Guiding Principles for scientific data management and stewardship. Scientific data.
- Wilkinson MD et al., 2019. Addendum. The FAIR Guiding Principles for scientific data management and stewardship. Scientific data.

Deliverables

Ref	Title	Due month
D.3.1.1	Database Structure for RM catalog	32-Aug2020
D 3.1.2	Synthesis Documents after questionnaire processing 1/ partners expectations 2/ list of existing sofwares 3/ technical choice	35-Nov2020
D 3.1.3	Searchable online RMs catalogue	46-Oct2021
D3.2.1	Deposit of RMs within mBRCs and collections considered as "reference collections"	51-Mar2022
D3.3.1	Signing of an MoU to ensure the sustainability of the CARE IS	59-Nov2022

Ref	Title	Due month
M.3.1.1	Define list of fields for the RM database	31-Jul2020
M3.1.2	Building questionnaire on expectations of CARE partners for the RM online catalog	31-Jul2020
M3.2.1	Training session on microbial collection management	52-Apr2022
M3.2.1	Training session completed	53-May2022
M3.3.1	Drafting MoU to be circulated among partners	49-Jan2022
M3.3.2	**L**aunching event of the CARE portal where stakeholders will be invited to sign the MoU	59-Nov2022

Objectives

- The aim of WP4 is to investigate and benchmark the availability and quality of the existing (meta-)data (in close collaboration with WP2) among the OHJPE members relevant for risk assessment.
- WP4 also aims, for higher comparability, to harmonise data and to increase the accessibility of the data by all OHEJP members.
- To avoid duplication and limited comparability with existing EU data collections and initiatives the CARE consortium aims to collaborate with ECDC and EFSA.
- To promote national participation in initiatives from EU authorities that serve to make high quality (meta-)data more readily available for risk assessments.

Description of work

WP: WP4 - Investigate, benchmark and improve the availability and the quality of the existing data relevant for risk assessment
WP start month: 25
WP end month: 54
WP Leader: Laurent Guillier, ANSES
Deputy WP Leader: Henk Aarts, RIVM
WP participants: ANSES, RIVM, IZSAM, DTU
WP4 will result in an assessment and benchmarking of the availability, relevance and quality of the existing (meta-) data, that is currently used among the OHJPE members for risk assessment. WP4 will also result in a high level of harmonised datasets and an increased accessibility of the data by all OHEJP members. Furthermore, in order to avoid duplication and limited comparability with existing EU data collections and initiatives the CARE consortium aims to collaborate with ECDC and EFSA. WP4 will not create its own database but will utilize an existing web platform to make the surveillance data

accessible for simple visualizations, comparisons with other open sources of data, and download in a single place.
The first activity of WP4 is to conduct a survey among the OHJPE members regarding the available data for risk assessment. Based on the outcome of this survey a roadmap will be developed in how to collaborate with (reporting) initiatives (like the SIGMA project, RAKIP etc.) and existing databases maintained by EU authorities to prevent limited comparability and duplication. Furthermore, a dissemination plan for encouraging the national authorities in charge to put emphasis on the collection and reporting of the above identified data to enable readily availability and an increasing amount of data for risk-assessments.
Task: JIP IA 2.1-WP4-T2 Metadata web platform
Task start month: 34
Task end month: 52
Task Leader: Laurent Guillier, ANSES
Deputy Task Leader: Rene Hendriksen, DTU
Task Participants: ANSES, RIVM, IZSAM, DTU.
Description of the task:
The resources allocated by DTU partner could not be committed in Y4 and Y5. The development of D.4.2.3 (web-platform) is cancelled for that reason. The other partners of this task propose to carry out the Y4 work related to the user guide describing how to access the available (D.4.2.1) in Y5. Based on the survey a user guide will be developed describing how to access the available data and furthermore to develop a strategy to raise awareness by EU authorities of collecting relevant and high quality data for risk-assessment and implement this strategy.

Task: JIP IA 2.1-WP4-T3
Task start month: 48
Task end month: 54
Task Leader: Laurent Guillier, ANSES
Deputy Task Leader: Henk Aarts, RIVM
Task Participants: ANSES, RIVM, IZSAM,
Description of the task:
A dissemination plan will be developed and executed to reach out to national authorities in charge of collecting metadata to put more emphasize on the collection of metadata suitable for risk assessment. This dissemination plan will be based on the results obtained and actions taken in JIP IA 2.1-WP4-T1 and JIP IA 2.1-WP4-T2. Furthermore, we will put effort in raising more awareness among the national authorities in making the data that are relevant for risk-assessment readily available for OHEJP members.

Deliverables		
Ref	Title	Due month
D.4.3	An executed dissemination plan	54
Milestones		
Ref	Title	Due month
M.4.3	Dissemination plan	50

2.4.1.1.22 JIP04-R2-IA2.2-OH-HARMONY CAP

Reference to the Strategic Research Agenda (please refer to D2.7)	**IA 2.2: Harmonised protocols and common best practice**									
Research Project Title	**One Health Harmonisation of Protocols for the Detection of Foodborne Pathogens and AMR Determinants**									
Research Project Acronym	**OH-Harmony Cap**									
Leading Organisation	**P13-SSI**				Deputy Leading Organisation		**P13-SSI**			
Project Leader	**Nadia Boisen**				Deputy Project leader		**Flemming Scheutz**			
Project Start month	**M25**				Project End month		**M60**			
Annual period of the OHEJP the work plan applies: Y5										
Participant	**1**	2	4	6	7	8	**9**	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	**BfR**	FLI	RKI	DTU
PM	**2,90**						**2,00**			
Participant	**13**	14	15	16	17	18	19	20	**21**	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	PHE
PM	**22,00**								**8,69**	
Participant	23	24	25	**26**	**27**	28	29	**30**	31	**32**
	UoS	OKI	NUIG	**TEAGASC**	**ISS**	IZSAM	IZSLER	**RIVM**	WbvR	**FHI**
PM				**2,40**	**16,50**			**2,28**		**1,42**
Participant	**33**	**34**	**35**	**36**	37	**39**	**40**	**41**	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	**SLV**	**FOHM**	**SVA**	NMVRVI	ISCIII
PM	**1,32**	**5,00**	**3,50**	**10,50**		**0,40**	**3,00**	**6,40**		
Participant	**44**	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM	**6,00**									

Objectives

- A benchmarking tool “OHLabCap”, mapping OneHealth laboratory interoperability, capacity and performance across all OHEJP member countries

- An overview of the sampling and analyses that are performed on behalf of our food business operators' HACCP-based self-control programmes
- A harmonised food safety data management system for EU
- Dissemination of the outcome of the OHLabCap surveys
- Strengthen the One Health interface by facilitating dissemination between NRLs and epidemiologists - Joint workshop with CARE and MATRIX
- Harmonised protocols for each of the chosen model organisms
- Training in harmonised protocols

Overall, M54-M60 will focus on dissemination, scientific reporting, publishing, participating in conferences, networking and, of course, presentation of scientific results.

Description of work

WP1: Project Coordination

This WP takes place over the first, second, and third annual period of the project. All the tasks run concurrently

WP start month: M25

WP end month: M60

WP Leader: 13-SSI

WP participants: 1-ANSES, 9-BfR, 13-SSI, 30-RIVM, 26-Teagasc, 41-SVA

Description of WP1: Description of WP1: This WP will focus on effective project management subdivided between internal coordination, external engagement, and knowledge building. The purpose is to enable collective activities, and ensure cohesiveness, efficacy, and sustainability. The intent is not only to enable seamless coordination between the five WPs, 11 countries, and 15 institutions but also to be flexible and address unforeseen problems as they arise. Furthermore, this WP ensures that roles and responsibilities are clearly defined.

Task: WP1-T1: **Internal coordination**

Task start month: M25

Task end month: M60

Task Leader: 13-SSI

Task Participants: 1-ANSES, 9-BfR, 13-SSI, 30-RIVM, 26-Teagasc, 41-SVA

Description of the task: This task is centred on SSI's long track record of coordinating complex health activities across multiple EU countries. With 15 participating institutions, the aim is to move the project forward, keeping staff on budget, meet deadlines, ensure quality deliverables, and realise the full impact of the project. Intra-project exchanges will be focused on effective communication strategy, i.e. conference calls, five face-to-face meetings, and automated data collection such as surveys. This task also ensures that the "model organism" tracks will be carried out into the WP-specific work.

Task WP1-T2: **External coordination, outreach and engagement**

Task start month: M25

Task end month: M60

Task Leader: 13-SSI

Task Participants: 1-ANSES, 9-BfR, 13-SSI, 30-RIVM, 26-Teagasc, 41-SVA

Description of the task: External engagement will be important to find synergies with other projects, obtain important and timely feedback from external partners, and effectively disseminate our own results. The aim is then to stay connected with external stakeholders. Particular attention will be given to collaboration with other EJP initiatives, particularly MATRIX and CARE, so they have a chance to contribute their views on current gaps, which will benefit OH integration. Practically, this will be achieved by workshops described in WP5.

Task WP1-T3: **Data management**

Task start month: M25

Task end month: M54

Task Leader: 13-SSI

Task Participants: 1-ANSES, 9-BfR, 13-SSI, 30-RIVM, 26-Teagasc, 41-SVA

Description of task: This task will continuously track, monitor, analyse, and store data in order to ensure progress throughout the project. The outcome then is a data asset that will be readily available for all our purposes, as well as those that may need this data in the future, also contributing to the sustainability of the project. The specific deliverable will be a preliminary data management plan, which can be adjusted as the project progresses.

Task: WP1-T4: **Sustainability**

Task start month: M25

Task end month: M60

Task Leader: 13-SSI

Task Participants: 1-ANSES, 9-BfR, 13-SSI, 30-RIVM, 26-Teagasc, 41-SVA

Description of task: Sustainability is an important cross-theme to all WPs, with considerations before, during, and after the project. The intent is that others find value in this work and build upon it once the project has concluded. Mechanisms include, but are not limited to, dissemination in peer reviewed publications, participation in external events, data sharing, and future collaborations across the One Health interface.

WP2: Development of the OHLabCap

WP2 takes place over the first, second and third year of the project

WP start month: M37

WP end month: M48

WP Leader: 13-SSI

Deputy WP Leader: 30-RIVM

WP participants: All OH-Harmony-Cap participants

Description of WP2: The aim of WP2 is to develop a benchmarking tool “OHLabCap”, by surveying One Health laboratory interoperability, capacity and performance across EU. The focus will be on the detection and typing of selected priority foodborne bacterial pathogens, AMR determinants, and

priority parasites across each sector (AH, PH, and FS). The main deliverable will result in the establishment of an OHLabCap that is repeatable and sustainable at both an EU and National level. An efficient tool *must* support harmonised data collection and validation, and encourage cross-sectoral communication and assist competent authorities in establishing and strengthen National networks. This requires identifying and characterising One Health laboratory interoperability, capacity and performance in each step within the system (e.g. coordination, data collection, analysis, interpretation, and dissemination of data). The tool will produce country-scale profiles of laboratory interoperability and identify gaps in capability and capacity. This tool will make use of the existing EULabCap without repeating existing surveys and incorporate AH and FS. To ensure this, two surveys will be developed: i) a pilot survey at the NRL level and ii) an adjusted survey in collaboration with the NRLs of the primary sector. A total of four tasks will be undertaken. The four tasks will run consecutively.

Task WP2-T4: **Scoring of collected data and chosen indicators**

Task WP2-T4 takes place during the second and third year of the project

Task start month: M43

Task end month: M54

Task Leader: 13-SSI

Deputy Task Leader: 30-RIVM

Task Participants: All OH-Harmony-Cap participants

Description of the task: The aim of task WP2-T4 is to evaluate, assess, and score the collected data and chosen indicators using scoring options similar to those used in the OHLabCap pilot survey (WP2-T1 and WP2-T2). Likewise, three subtasks will be undertaken

Subtask WP2-T4-S1 (M43-M46): Analyses including identification of gaps and challenges of the adjusted survey results.

Subtask WP2-T4-S2 (M46-47): Prepare the One Health map of the levels of system capability/capacity/interoperability for the primary diagnostic laboratories in each of the EU/EEA countries and dissemination.

The overall outcome will be an integrated One Health map of the levels of system capability/capacity/interoperability/adaptability for each of the chosen organisms for the primary diagnostic laboratories in the EU/EEA countries. This tool will not include an evaluation of surveillance capacities and capabilities (EUEpiCap), which is included in MATRIX. However, collaboration is planned, including a joint workshop between OH-Harmony-Cap and MATRIX if both projects are funded (WP5-T3).

JIP04-WP2-T5: Development of a survey targeting the food sectors self control

Task month: M37-M50 (ongoing)

WP Leader: 39-SLV. Deputy WP Leader: 13-SSI

Task participants: 1-ANSES, 9-BfR, 13-SSI, 33-NVI, 35-INIAV, 30-RIVM, 44-BIOR, 45-Ruoka, 43-ISCIII

Task description: The primary aim of this task is to provide an overview of the sampling and analyses that are performed on behalf of our food business operators' HACCP-based self-control programmes. Due to the lack of knowledge and overview of how many samples that are taken and processed by

the food business operators, the project is undertaking a survey targeting food business operators' HACCP-based self-control programmes. This mini survey is – to our knowledge – the first of its kind. It is expected to give a first glimpse of which food categories that are examined, the number of positive samples for each of the pathogens, and will provide information on accreditation, participation in EQA programmes and storage and/or sharing of positive samples. This is an important data collection exercise to help describe the One Health microbiology system by surveying food laboratories across all EU/EEA countries. We will use this information to identify gaps and needs necessary to develop and implement harmonised and compatible protocols for the detection and typing of foodborne pathogens across One Health. It is our hope that this initiative will encourage further communication between private food business operators and One Health authorities. In the letter of invitation, it is clearly stated that participation in the survey is anonymous. Additionally, the gathered information will be; 1) included in a technical report, and 2) the results of the survey will be open source data and will be published on https://onehealthejp.eu/jip-oh-harmony-cap/, and 3) data will not be used for commercial purposes.

WP3: One Health Laboratory Interoperability Guidance

WP3 takes place during the first, second, and third year of the project

WP start month: M25

WP end month: M54

WP Leader: 26-Teagasc

Deputy WP Leader: 36-INSA

WP3 participants: 1-ANSES, 9-BfR, 13-SSI, 21-APHA, 26-Teagasc, 27-ISS, 30-RIVM, 33-NVI, 34-PIWet, 35-INIAV, 36-INSA, 39-SLV, 40-FOHM, 41-SVA

Description of WP3: The overall aim of this WP is to map the existing knowledge gaps and propose new studies and/or methods that are needed to fill them. The main deliverable will be a roadmap, of the chosen model organisms, for systematic methodological improvement with respect to One Health laboratory interoperability. This includes developing a modern harmonised system for food, feed, animal and human sampling and testing in Europe. Three tasks will be undertaken: Sampling, Characterisation, and Data management. This WP does *not* include analysis of specific protocols. Shiga Toxin producing *E. coli* (STEC), Enterotoxigenic *E. coli* (ETEC), Cryptosporidium and AMR for *Salmonella* and *Campylobacter* have been pre-selected for the project's purposes

Task WP3-T3: **Data Management**

Task WP3-T3 takes place during the second and third year of the project

Task start month: M46

Task end month: M54

Task Leader: 26-Teagasc

Deputy Task Leader: 36-INSA

Task Participants: 1-ANSES, 9-BfR, 13-SSI, 21-APHA, 26-Teagasc, 27-ISS, 30-RIVM, 33-NVI, 34-PIWet, 35-INIAV, 36-INSA, 40-FOHM, 41-SVA

Description of the task: This task aims at describe harmonised reporting including foodborne pathogen data management within individual MSs and data transfer to EFSA and ECDC.

Sub-task WP3-T3-ST1 (M46-M50): The responses to the questionnaire (sub-task WP3.T1.S1) will be used to establish current data management practices with individual MSs and how this data is communicated to EFSA and ECDC.

Sub-task WP3-T3-ST2 (M49-54): Experts from ICT companies will be invited to present their data management systems to a panel of personnel (with relevant experience) from within the project and external experts (eg. personnel in EFSA and ECDC who collate and analyse this data). Recommendations on best practice used to form the basis for a harmonised system for recording, storing and transferring data with the EU.

The deliverable will be a summary report (drafted by the WG but reviewed by all project participants) describing; [1] currently used data management systems in Europe; [2] a harmonised data management system for the future and [3] recommendations on how this system should be implemented (hard ware, software, motivating MSs, etc.).

WP4 Harmonisation of Protocols

This WP takes place over the first, second, and third annual period of the project

WP months: M25-M50. WP Leader: 27-ISS. WP Deputy Leader: I-ANSES

WP participants: 1-ANSES, 9-BfR, 13-SSI, 21-APHA, 27-ISS, 32-NIPH, 30-RIVM, 33-NVI, 34-PIWet, 35-INIAV, 36-INSA, 39-SLV, 40-FOHM, 41-SVA, Bior

The aim of WP4 is to produce recommendations on how to harmonise the methodology for the detection and typing of the model pathogens. These pathogens will be selected as examples for the project's purposes, and identified candidates include Shiga toxin producing *E. coli* (STEC), enterotoxigenic *E. coli* (ETEC) and *Cryptosporidium* and AMR for *Salmonella* and *Campylobacter*. The strategy and the approaches adopted in the framework of WP4 activities may be transferred to other pathogens, enabling harmonisation of methodologies in use in the EU/EEA laboratories

JIP4-WP4-T3: Ranking and choice of laboratory protocols

Task months: M39-M54

Task Leader: 34-PIWet. Deputy Task leader: 1-ANSES

Task description: WP4 participants will be enrolled in the ranking of the protocols for the detection and typing of the selected model organisms. Once the ranking of the protocols will be completed, harmonised procedures will be proposed on the basis of the ranking exercise. The protocols will be distributed to the laboratories participating in the WP4, and a preliminary test of selected procedures will be carried out by a set of participating laboratories using reference materials. Focus is on procedures for the characterization of the model organisms. Besides, the chosen model organisms, we will also include a harmonised protocol for the detection of ipaH positive organisms followed by an evaluation of the usefulness of the gene *lacY* to distinguish between Enteroinvasive *E. coli* (EIEC) and *Shigella*. 13- SSI will lead the EIEC/Shigella additional output.

Overall, the results of this excercise will be useful to evaluate the performance of the proposed methodologies prior their application in WP5-T3 (training). The possibility to exploit the reference collection set up in JIP-CARE will be explored.

Task Participants: 1-ANSES, 13-SSI, 21-APHA, 27-ISS, 32-NIPH, 30-RIVM, 33-NVI, 34-PIWet, 35-INIAV, 36-INSA, 39-SLV, 40-FOHM, 41-SVA, ISCIII, and BIOR

WP5: Training sessions on harmonised protocols

WP5 will take during the second and third year of the project

WP start month: M40

WP end month: M60

WP Leader: 27-ISS

Deputy WP Leader: 13-SSI

WP participants: All OH-Harmony-Cap participants

Description of WP5: The aim of this WP consist in increasing EU capacity to deal with foodborne zoonoses, antimicrobial resistance and emerging threats across the One Health interface through partner-to-partner delivery of training. The training will provide opportunities for better communication, knowledge exchange, and knowledge integration within the One Health interface, and not just for the OH-Harmony-Cap participants. As such, two workshops will be held during the final meeting in Copenhagen. Copenhagen was chosen for two reasons; 1) joint meeting with MATRIX and CARE, and 2) logistically, Copenhagen is easily accessible for most participants, thus ensuring a high attendance. Finally, practical workshops and e-learning activities dedicated to the application of the harmonised protocols developed in WP4 on a set of foodborne pathogens will be organised.

Task WP5-T1**: Facilitation and communication of the OHLabCap**

Task WP5-T1 will take place during the second and third year of this project

Task start month: M40

Task end month: M57

Task Leader: 13-SSI

Task Participants: All OH-Harmony-Cap participants

Description of the task: A workshop for communicating and discussing the outcome of the OHLabCAP survey conducted in the framework of WP2 will be organized and planned in Y4 and the dissemination will take place in Copenhagen during the final annual meeting in Y5. The workshop will be a combination of presentations and workgroup discussions where sessions will be split into predetermined topics based on the outcome of WP2. The aim is to establish and suggest guidelines to increase the interoperability, capacity and performance of harmonised data collection and validation, and encourage cross-sectoral communication and assist competent authorities in establishing and strengthen National networks.

Task WP5-T2**: Joint workshop between CARE, OH-Harmony-Cap, and MATRIX**

Task WP5-T2 will take place during the second and third year of this project

Task start month: M40

Task end month: M57

Task Leader: 13-SSI

Task Participants: All participants from CARE, OH-Harmony-Cap, and MATRIX

Description of the task: The three integrative projects, CARE (IA2.1), OH-Harmony-Cap (IA2.2), and MATRIX (IA2.3) propose a joint workshop, if funded, where the outcomes of CARE, OHLabCap, and EUEpiCap (WP4, MATRIX) will be presented. The aim is to strengthen the One Health interface by facilitating dissemination between NRLs and epidemiologists. The focus of the workshop will be the

description of gaps and challenges in the communication between laboratories and epidemiologists, and discuss recommendations to ultimately improve One Health surveillance and outbreak detection. The workshop will consist of presentations, held by CARE, OH-Harmony-Cap, and MATRIX, which will provide the background for workgroup discussions. Sessions will be split into predetermined topics decided by CARE, MATRIX and OH-Harmony-Cap (D-5.2)

Task WP5-T3**: Training sessions in harmonised protocols**

Task WP5-T3 will take place during the third year of this project

Task start month: M40

Task end month: M60

Task Leader: 27-ISS

Deputy Task Leader: 13-SSI

Task Participants: 1-ANSES, 13-SSI, 27-ISS, 35-INIAV

Description of the task: Practical workshops and e-learning activities dedicated to the application of the harmonised protocols developed in WP4 on a set of foodborne pathogens will be organised.

WP5-T3-ST1 Practical workshops: Ad hoc training programs will be developed for the benefit of the project's participants operating either in the veterinary or medical areas expressing the interest of participating in such hands-on workshops. These practical training sessions will be pivotal for the assessment of the protocols deployed and to implement the harmonisation between the different sectors. The trainings will consist of three days of laboratory activities on the application of the harmonised protocols developed. Three practical workshops, focusing on the model organisms considered in this project, will be held at ISS and SSI. Training for STEC/ETEC and Cryptosporidium will be held at ISS and training for AMR will be held at SSI. Three different rounds (STEC/ETEC, Cryptosporidium, and AMR) will be foreseen, in order to allocate maximum four scientists in the laboratory (for a total of 8 scientists visiting ISS and SSI).

WP5-T3-ST2 E-learning: Dissemination of the application of the harmonised protocols through e-learning. Besides the practical workshops, training sessions on the harmonised protocols will be deployed also through the use of several e-learning tools, including webinars and distance learning e-modules. This would enable a high level of dissemination of the project's achievements. The participating institutes have distance learning facilities and experience on the development of webinars and e-learning courses. All the training delivered will have a final step of assessment of the achievement of the learning objectives.

Deliverables		
Ref	Title	Due month
D-IA2.2.OH-Harmony-Cap 2.4	Intergrated OneHealth Instrument	M54
D-IA2.2.OH-Harmony-Cap 2.5	Technical report: overview of the sampling and analyses that are performed on behalf of our food business operators HACCP-based self-control programs	M50

D-IA.2.2.OH-Harmony-Cap.4.3	A technical report of Harmonised protocols including; 1) detection of selected pathogens, and 2) characterisation (e.g. virulence genes asset) and typing of pathogens.	M54
D-IA2.2.OH-Harmony-Cap 3.3	A harmonised food safety data management system for Europe	M54
D-IA2.2.OH-Harmony-Cap 5.1	Workshop	M57
D-IA2.2.OH-Harmony-Cap 5.2	Workshop	M57
D-IA2.2.OH-Harmony-Cap 5.3	Training programs for the application of the harmonised protocols	M54-M60
D-IA2.2.OH-Harmony-Cap 5.4	E-learning modules on the application of the harmonised protocols	M60
Milestones		
Ref	Title	Due month
M-IA2.2. OH-Harmony-Cap.7	Delivery of practical workshops on the harmonised protocols	M54-M60
M-IA2.2. OH-Harmony-Cap.8	Delivery of e-learning sessions on the harmonised protocols	M60

2.4.1.1.23 JIP05-R2-IA2.1-MATRIX

Reference to the Strategic Research Agenda (please refer to D2.7)	**I.A 2.3**									
Research Project Title	**MATRIX: Connecting dimensions in one-health surveillance**									
Research Project Acronym	**MATRIX**									
Leading Organisation	**P13-SSI**				Deputy Leading Organisation		**P41-SVA**			
Project Leader	**Guido Benedetti**				Deputy Project leader		**Estelle Ågren**			
Project Start month	**M25**				Project End month		**M60**			
Annual period of the OHEJP the work plan applies: Y5										
Participant	**1**	2	4	6	7	8	**9**	**10**	11	**12**
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	**BfR**	**FLI**	RKI	DTU
PM	**4,55**						**10,30**	**4,20**		
Participant	**13**	14	15	**16**	**17**	18	19	20	**21**	22
	SSI	UT	VFL	**INIA**	**UCM**	MVNA	INRA	IP	**APHA**	PHE
PM	**14,50**			**14,00**					**4,65**	
Participant	**23**	24	25	26	**27**	**28**	29	**30**	**31**	**32**
	UoS	OKI	NUIG	TEAGASC	**ISS**	**IZSAM**	IZSLER	**RIVM**	**WbvR**	**FHI**
PM	**4,20**				**4,50**	**13,50**		**4,00**	**2,60**	**11,18**
Participant	**33**	**34**	35	**36**	37	39	**40**	**41**	42	43
	NVI	**PIWET**	INIAV	**INSA**	IISPV	SLV	**FOHM**	**SVA**	NMVRVI	ISCIII
PM	**4,99**	**12,50**		**11,50**			**3,00**	**13,00**		
Participant	44	**45**	46	47						
	BIOR	**RUOKA**	THL	NEBIH						
PM		**10,13**								
Objectives • Evaluate the sectorial frameworks, for specific inter-sectorial hazards • Identify commonalities across the tracks, to propose a common OHS framework when applicable • Develop strategies for surveillance systems based on output-based metrics										

- Application and evaluation of the tool
- Develop a national OH surveillance roadmap template
- Create a Knowledge Integration Platform
- Training and dissemination
- Defining the content needs for cross-sectorial decision and collaboration dashboards
- Technical implementation and testing of dashboards

WP0: Coordination
This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 13-SSI
Deputy WP Leader: 41-SVA
WP participants: 1-ANSES, 9-BfR, 10-FLI, 13-SSI, UCPH, 16-INIA, 21-APHA, 23-UoS, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA, 45-RUOKA
Description of the WP: Description of the WP: This is a "housekeeping" collection of activities, to ensure project cohesiveness, efficacy, and sustainability.

Task: WP0-T1: Internal coordination
Task start month: M25
Task end month: M60
Task Leader: 13-SSI
Deputy Task Leader: 41-SVA
Task Participants: 1-ANSES, 9-BfR, 10-FLI, 13-SSI, UCPH, 16-INIA, 21-APHA, 23-UoS, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA, 45-RUOKA
Description of the task: Regular meetings to coordinate the work across WPs and weave the work of tracks into the WP-specific work.

Task: WP0-T2: External coordination and communication
Task start month: M25
Task end month: M60
Task Leader: 13-SSI
Deputy Task Leader: 41-SVA
Task Participants: 1-ANSES, 9-BfR, 10-FLI, 13-SSI, UCPH, 16-INIA, 21-APHA, 23-UoS, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA, 45-RUOKA
Description of the task: continuous work to publish project progress updates and stay connected with other OHEJP projects (from the first and second phases), as well as external projects of relevance. Continued communication with stakeholders.

Task: WP0-T3: Data management
Task start month: M25
Task end month: M60
Task Leader: 9-BfR
Deputy Task Leader: 41-SVA
Task Participants: 9-BfR, 13-SSI, 28-IZSAM, 41-SVA
Description of the task: Development of a data management plan and continuous update until the end of the project.

Task: WP0-T4: Sustainability
Task start month: M25
Task end month: M60

Task Leader: 13-SSI
Deputy Task Leader: 41-SVA
Task Participants: 9-BfR, 13-SSI, 28-IZSAM, 32-FHI, 33-NVI, 41-SVA
Description of the task: Continuous identification and documentation of sustainability challenges and opportunities to address them. Sustainability here refers specifically to the maintenance of project outputs after its conclusion.

WP1: Existing frameworks and OH capacity

This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 10-FLI
Deputy WP Leader: 13-SSI
WP participants: 1-ANSES, 10-FLI, 13-SSI, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA.
Description of the WP: The aim of WP1 is to provide guidelines for adapting existing AH, PH, and FS surveillance frameworks into systems that can support sectorial surveillance of inter-sectorial hazards. This WP will therefore focus on existing relevant surveillance frameworks found within each of the three individual sectors and how these frameworks can be adapted and improved to support One Health Surveillance (OHS) of inter-sectorial hazards. Furthermore, this WP will continue and build upon the work already undertaken in COHESIVE and ORION, as well as previous and current initiatives, such as RISKSUR, HOTLINE, STOC-FREE, SIGMA, COMPARE, and EFFORT. WP1 will revise frameworks within each sector, and provide input for the cross-sectorial work carried out in all other WPs.

Task: WP1-T2: Generate suggestions for adaptation of existing frameworks into a common sectorial framework (AH, PH, FS) which can support surveillance of inter-sectorial hazards (OHS)
Task start month: M37
Task end month: M54
Task Leader: 10-FLI
Deputy Task Leader: SSI
Task Participants: 1-ANSES, 10-FLI, 13-SSI, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA.
Description of the task: This task is concerned specifically with providing guidelines for the adaptation/improvement of surveillance in each individual sector, but addressing specifically surveillance targeting inter-sectorial hazards (foodborne pathogens, AMR, and emerging threats). Participants of the consortium will provide their input in requirements for such a framework. Stakeholders involved in the project will be able to participate in this step and help in the development of the framework for sectorial support to OHS.

Task: WP1-T3: Evaluation of the sectorial frameworks, for specific inter-sectorial hazards
Task start month: M49
Task end month: M60
Task Leader: 10-FLI
Deputy Task Leader: 13-SSI
Task Participants: 1-ANSES, 10-FLI, 13-SSI, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 31-WBVR, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA.
Description of the task: Case studies within the participating countries of the consortium (at least three) will evaluate the applicability and suitability of the developed common framework for OH surveillance. The specific hazard tracks will serve as the case studies, but upon interest in specific countries, further hazards may be evaluated. Problems identified in the process will be evaluated, and the sectorial frameworks will be adapted and modified using stakeholder input.

WP2: Best-practices and multi-sectorial collaboration

This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 28-IZSAM
Deputy WP Leader: 13-SSI
WP participants: 1-ANSES, 9-BfR, 10-FLI, 13-SSI, 16-INIA, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 41-SVA
Description of the WP: WP2 aims to provide a common framework across sectors with best practices for data collection, analysis, and dissemination of surveillance results, and facilitate OH collaboration across sectors. The dissemination of results, in particular, has been extensively addressed in the first round of OHEJP projects (ORION and COHESIVE), therefore MATRIX will focus more on the other steps of the surveillance continuum, and how the results brought forward by ORION and COHESIVE can be brought into surveillance practice, connecting surveillance practice to outputs dissemination.
While WP1 focuses on strengthening surveillance within each sector, to support OHS, WP2 is concerned with cross-sectorial collaboration and the operationalization of OHS surveillance as a multi-sectorial activity. The outcome is to add more value to existing surveillance related processes, with a focus on loops of feedback among sector agencies in order to inform decision making, while simultaneously avoiding duplication and overlapping processes with systems already in place. Using information generated by individual agencies to inform surveillance decision across sectors is highly dependent on effective collaboration. Therefore, the development of best-practices will be strongly supported by the development of guidelines and compilation of effective strategies for multi-sectorial collaboration. This WP is linked to WP1 and will utilise the outputs of WP1 to identify cross-sectorial linkages in order to define a common framework for OHS of inter-sectorial hazards. This information will further be utilised by WP5 and WP6.

Task: WP2-T3: Propose best-practice guidelines and effective strategies for data collection, analysis and dissemination aimed at multi-sectorial OH collaboration, for each specific track.
Task start month: M33
Task end month: M54
Task Leader: 28-IZSAM
Deputy Task Leader: 41-SVA
Task Participants: 1-ANSES, 9-BfR, 13-SSI, 16-INIA, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 41-SVA
Description of the task: This task will be concerned with developing best practices for multi-sectorial collaboration to operationalize OHS. These will address data sharing, dealing with data sharing limitations, data analysis, and interpretation and dissemination of outputs. The work in this task will be hazard specific (hazard tracks). This work will gather the conclusions from the first round of OHEJP projects, in particular the integrative ones and NOVA (focused on surveillance), and consolidate them into a suggested framework of OHS surveillance. These will cover both the aspects of collaboration among people, as well as the technical aspects for implementation. In other words, a practical guide for concrete implementation of the results of previous projects, advancing OHS practice.

Task: WP2-T4: Identify commonalities across the tracks, to propose a common OHS framework when applicable.
Task start month: M46
Task end month: M60
Task Leader: 30-RIVM
Deputy Task Leader: 13-SSI
Task Participants: 1-ANSES, 9-BfR, 13-SSI, 16-INIA, 21-APHA, 27-ISS, 28-IZSAM, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 41-SVA

Description of the task: The work in the previous track will be hazard-specific. This task will be concerned with identifying the similarities among tracks, and producing a common OHS framework, which can serve as the basic foundation of OHS implementation.

WP3: Output-based surveillance evaluation

This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 21-APHA
Deputy WP Leader: 34-PIWET
WP participants: UCPH, 21-APHA, 28-IZSAM, 31-WBVR, 34-PIWET, 36-INSA, 41-SVA
Description of the WP: The aim of WP3 is to develop guidelines for the design, implementation, and evaluation of official controls within the food sector using output-based standards. Although legislation already allows for countries to take an output-based standards approach to surveillance, previous work within the RISKSUR project identified that few countries are currently implementing this approach, with most of the surveillance, control and monitoring programmes relying on input-based standards instead. In this context, WP3 will assess the suitability of using output-based standards for OHS using several different worked examples from the hazard specific tracks included in MATRIX. WP3 is linked with the food sector part of WP1 and WP2. The output of this WP will, where possible, be streamlined to correlate with the roles and messages of national risk managers and standard setting bodies.

Task: WP3-T2: Identification of operational partners and stakeholders
Task start month: M25
Task end month: M60
Task Leader: 21-APHA
Deputy Task Leader: 34-PIWET
Task Participants: 21-APHA, 33-NVI, 34-PIWET, 36-INSA
Description of the task: Each participating country will select the appropriate members of AH, PH and FS competent authorities as required to reflect the heterogeneity in governance of official controls within different countries. Makeup of the operational partners will include stakeholders from design and implementation of 'official control' schemes. As the identification of operational partners is important to designing schemes suitable for the specific environment, this deliverable starts from the beginning of the project and is constantly reviewed throughout the life of the project.

Task: WP3-T3: Selection of appropriate output-based surveillance systems
Task start month:M37
Task end month: M54
Task Leader: 21-APHA
Deputy Task Leader: 31-WBVR
Task Participants: UCPH, 21-APHA, 28-IZSAM, 31-WBVR, 33-NVI, 34-PIWET, 36-INSA, 41-SVA
Description of the task: Key to the effectiveness of surveillance systems is the selection of appropriate methodologies to achieve the objectives of the surveillance system. While this work is part of a wider project that is focused on One-Health activities, there may be situations where specific industry focused efforts are most effective and efficient. Each of the partners involved will select a surveillance pathogen or contaminant that is relevant to their specific situation. In some cases there may not be a single target, but a suitable system such as new and emerging diseases. Selection of an appropriate output-based methodology to suit the objectives of the surveillance system will be made by each participating country

- Surveillance sensitivity approaches
- Probability of freedom (subject to suitable models)

- Expected cost of error (novel application) with examples

Task: WP3-T4: Development of evaluation strategies for surveillance systems based on output-based metrics
Task start month: M40
Task end month: M60
Task Leader: 34-PIWET & 28-IZSAM
Deputy Task Leader: 21-APHA
Task Participants: UCPH, 21-APHA, 28-IZSAM, 31-WBVR, 34-PIWET, 36-INSA, 41-SVA
Description of the task: Having decided on the most suitable approach for a surveillance system there are a number of different parameters that require defining, for example the metric(s) to be measured, the thresholds and boundaries for the metric(s), and the frequency of evaluation. The metrics that are used within a surveillance system will directly influence how the system may be evaluated. RISKSUR has already produced a very comprehensive design tool for surveillance systems, but tailoring it for output-based surveillance will require revision and addition of modules. Operational partners within each participating country will need to agree the most appropriate output metrics that are to be used in the development of a standard. Although each country is following the same guidance, the diversity in production type and systems across the partner institutes will require an individualised approach from each partner to identify the thresholds and boundaries of the metrics and the frequency of evaluation.

WP4: EUEpiCap
This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 1-ANSES
Deputy WP Leader: 23-UoS
WP participants: 1-ANSES, 10-FLI, 13-SSI, 16-INIA, 23-UoS, 34-PIWET
Description of the WP: The objective of WP4 is to develop a benchmarking tool "EUEpiCap" to support performance monitoring and evaluation of OH surveillance activities across MS, by sector. In practice, OHS comprises the shared collection, collation, analysis and collaborative interpretation of information produced for and by surveillance systems from diverse sectors. A truly efficient OHS would ensure that surveillance inputs (data and resources) and outputs from systems that may vary widely in scope, objectives and methods/activities are accessible, comparable and easy-to-use by other sectors. This requires identifying and characterising the processes across AH, PH and FS sectors regarding practices and resources at each step of the surveillance system (e.g. governance and coordination, data collection, collation, analysis, interpretation and dissemination of data) in order to identify barriers and best-practices towards the implementation of OH surveillance. WP4 aims to develop a generic benchmarking tool, EUEpiCap, for characterizing, monitoring and evaluating surveillance capacity and capabilities within each sector (AH, PH, FS) that supports OHS. The tool will produce country-scale profiles of surveillance interoperability between sectors and highlight needs in surveillance capabilities and capacity. Comparison of results among systems and MS will allow identification of best-practices and making recommendations to facilitate the development and implementation of OHS approaches and improve existing OHS frameworks by providing targeted advice. This tool will not include an evaluation of laboratory capacities and capabilities, which are targeted by the existing EULabCap survey tool. Close collaboration is planned, including a common workshop, between MATRIX and the proposed OH-HARMONY-CAP for laboratory capacities if both projects are funded.
Task: WP4-T2. Development of the surveillance capacity benchmarking tool
Task start month: M37
Task end month: M54
Task Leader: 23-UoS

Deputy Task Leader: 1-ANSES
Task Participants: 1-ANSES, 10-FLI, 16-INIA, 23-UoS, 33-NVI, 34-PIWET
Description of the task: The evaluation framework is organized around three dimensions: organization, operational activities, and impact of the OHS system. Each dimension is then divided into four targets, each including a set of specific indicators. In this task, we will single out the necessary criteria to support the evaluation of the indicators, i.e. identify specific elements that must be included to get the highest score for each indicator. The evaluation will rely on a semi-quantitative approach. Indicator definitions and weights will be validated through expert consultation. A questionnaire will be developed to collect data necessary for the evaluation.
We will develop an R Shiny-based interface to record data for each indicator included in the assessment, through a questionnaire. The interface will automatically generate synthetic country profile reports to facilitate diffusion of results. The interface will allow exploration of the completed and/or uploaded assessment(s) by way of multiple visualizations (interactive radar charts and/or lollipop plots). A tutorial will explain how to use the tool.
The tool will be tested in a pilot-stage for several combinations of hazards and countries. Different hazard tracks (i.e. Salmonella, Campylobacter, Listeria and emerging threats (i.e. AMR)) would be targeted.

Task: WP4-T3: Application and evaluation of the tool
Task start month: M49
Task end month: M60
Task Leader: 1-ANSES
Deputy Task Leader: 23-UoS
Task Participants: 1-ANSES, 16-INIA, 23-UoS, 33-NVI, 34-PIWET, 13-SSI
Description of the task: The EUEpiCap tool will be applied on hazard-specific OH surveillance systems (among those identified in WP1) in MS. Results from the tool will allow i) identifying commonalities between AH, PH, and/or FS sectors and potentials for development of multi-sectorial interoperability, ii) highlighting current gaps and barriers to overcome in each sector for the OHS purpose, and iii) develop profiles to advise better implementation of existing OHS initiatives and expand OHS across similar contexts.

WP5: Outreach and roadmap
This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 9-BfR
Deputy WP Leader: 41-SVA
WP participants: 9-BfR, 13-SSI, 21-APHA, 23-UoS, 27-ISS, 28-IZSAM, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 36-INSA, 40-FoHM, 41-SVA, 45-RUOKA
Description of the WP: The objective of WP5 is to create a roadmap for future development of national OH surveillance activities, specifically targeted at different levels of infrastructural and economic capacities. This OHS roadmap template will take into consideration: the heterogeneity of OHS capacities, resources, and developments across MS, as well as the OHS frameworks and solutions identified by WP1, WP2, WP3, and WP4. A high-level strategy that addresses opportunities for better communication, knowledge exchange and knowledge integration between OHS domains will be outlined in this WP. WP5 will set up a technical platform supporting knowledge exchange between the different MATRIX partners with close connection to the overarching EJP platform.

Task: WP5-T2: Develop a national OH surveillance roadmap template
Task start month: M37
Task end month: M60
Task Leader: 41-SVA

Deputy Task Leader: 9-BfR
Task Participants: 9-BfR, 21-APHA, 23-UoS, 27-ISS, 28-IZSAM, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 40-FoHM, 41-SVA, 13-SSI
Description of the task: This task creates the actual OHS roadmap template on the basis of the requirements and findings outlined in Task WP5-T1. This roadmap is a high-level strategic guide (similar to a checklist), outlining key elements needed for (future) national development of cross-sectorial and trans-disciplinary surveillance capacity. The development process (road mapping) will be supported by four meetings/workshops of experts and stakeholders to 1) create a common understanding of the outcomes and opportunities of the OHS roadmap template, 2) identify and align key-elements (e.g. activities, approaches, developments) needed for future OHS developments, 3) create a strategic guide, including an approach for sustainability, and 4) re-evaluate and update the strategic guide based on scenarios from the different project tasks.

Task: WP5-T3:Knowledge-Integration Platform
Task start month: M25
Task end month: M60
Task Leader: 9-BfR
Deputy Task Leader: 41-SVA
Task Participants: 9-BfR, 13-SSI, 21-APHA, 27-ISS, 30-RIVM, 32-FHI, 33-NVI, 34-PIWET, 41-SVA, 45-RUOKA
Description of the task: The objective is to establish a web-based Knowledge-Integration Platform. This platform facilitates and enhances interaction/collaboration between OHS stakeholders (e.g. EFSA and ECDC) and project members. It will offer resources (e.g. tools/technologies/features) supporting collaborative collection, exchange, management and creation of knowledge. The Knowledge-Integration Platform will support three main objectives: 1) to identify stakeholder needs, 2) to enable collaborative and synergetic work and prevent duplication of work, and 3) to inform project members about past, ongoing and future OHS initiatives. The Platform will further facilitate the dissemination and permanent access to project outcomes from all WPs.

Task: WP5-T4: Training and dissemination
Task start month: M25
Task end month: M60
Task Leader: 9-BfR
Deputy Task Leader:41-SVA
Task Participants: 9-BfR, 13-SSI, 21-APHA, 27-ISS, 28-IZSAM, 32-FHI, 34-PIWET, 36-INSA, 41-SVA, 45-RUOKA
Description of the task: This task will cover knowledge dissemination and training. Information about past, ongoing and future OHS initiatives and projects on EU level will be given trough “OHS Briefings” (e.g. webinars/meetings), which will be held regularly. These briefings support the aims of the Knowledge-Integration Platform (outlined in Task 5.3) and actively involve stakeholders (e.g. EFSA and ECDC). The sub-task for creation of a web-portal is closely linked to the Knowledge-Integration Platform and aims at making training material (e.g. tutorials, videos, and guidelines) publicly and permanently available to internal and external OHEJP partners. Large resources will also be allocated to external trainings to share the generated knowledge and train external experts.

WP6: Decision and collaboration dashboards
This WP takes place over the third, fourth, and fifth annual period of the EJP
WP start month: M25
WP end month: M60
WP Leader: 41-SVA
Deputy WP Leader: 32-FHI

WP participants: 1-ANSES, 9-BfR, 10-FLI, 13-SSI, 21-APHA, 28-IZSAM, 32-FHI, 33-NVI, 34-PIWET, 40-FoHM, 41-SVA, 45-RUOKA
Description of the WP: WP6 will focus on visualisation of OHS inputs and outputs for the use of surveillance officials in PH, AH and FS. This will be achieved by the creation of dashboards, an information centre for collaboration and decision making in surveillance for specific hazards. The dashboards will include surveillance data from all three sectors to the extent that data accessibility agreements allow (timelines, level of aggregation and level of details). This WP will not build a data-sharing platform, it will work on converting already available data into actionable information.
The ORION project has identified data sources that are already public or shared across sectors. The NOVA project is building automated routines for data analyses and visualization when trend monitoring is possible. The MATRIX project will build on these results to create an information centre where all data/information shared will have rich contextual meta-data/meta-information, allowing explicit consideration of possible pitfalls and biases when OH data is co-analysed, which is crucial for the right decision-making. Trend monitoring and signal detection will be performed and visualised jointly across sectors for specific hazards. The issue of multi-sectorial data analysis will be addressed specifically. The dashboards will include not only data and statistical outputs, but also all important surveillance information for specific zoonoses such as contact persons, workflow, and regulations, as such depicting the full OHS structure for that hazard.

Task: WP6-T2: Defining the content needs for cross-sectorial decision and collaboration dashboards
Task start month: M34
Task end month: M60
Task Leader: 41-SVA
Deputy Task Leader: 40-FOHM
Task Participants: 1-ANSES, 9-BfR, 21-APHA, 28-IZSAM, 32-FHI, 33-NVI, 34-PIWET, 40-FoHM, 41-SVA, 45-RUOKA
Description of the task: Each participating country (at least 2) will choose one or more zoonotic pathogens from the “hazard tracks” to serve as the “case study” for dashboard construction. Surveillance officials in the sectors of AH, PH, and FS will be invited to workshops to present the dashboard concept, and spark inter-agency discussions on the possibilities and problems that can be addressed with joint analyses and/or visualization of data. Design of the dashboards will be driven from the end user perspective, that is, what information does a surveillance official need on their everyday work, and in case of emergency? What kind of data can provide that information? This will lead to a specific discussion on what kind of contextual information must be presented with the data, so that the data can lead to right conclusions even across domains/agencies. Information gaps and methodological limitations, in particular, will be documented to allow the information presented to be correctly interpreted, from their original collection context, into the OH surveillance context. Technical and legal barriers associated with data sharing across sectors will be documented. Within the timeframe of MATRIX, it is not expected that new data agreements will be put into place. Rather, we will document current possibilities and constraints, and build upon achievements from the previous integrative projects.

Task: WP6-T3: Technical implementation and testing of dashboards
Task start month: M37
Task end month: M60
Task Leader: 32-FHI
Deputy Task Leader: 41-SVA
Task Participants: 1-ANSES, 9-BfR, 13-SSI, 21-APHA, 28-IZSAM, 32-FHI, 33-NVI, 34-PIWET, 40-FOHM, 41-SVA, 45-RUOKA
Description of the task: This task is concerned specifically with the technical implementation of the dashboards, following the vision set by task WP6-T2. Dashboards will be coded using open source

tools only, and all codes made available through the deliverable. The agencies involved will share codes, and progress in parallel through regular teleconference meetings. Through collaboration with WP5 (outreach), we will ensure that the results of this WP can be available and implementable by other interested member states (MS). The dashboards will be tested by surveillance officials from AH, PH and FS in each country individually, and joint workshops will be organized to get feedback on user friendliness, and features to strengthen. The issue of sustainability will be addressed, documenting potential issues and suggested actions to ensure that the dashboards can remain a tool to support decision-making after the implementation phase and as cycles of surveillance continue.		
Deliverables		
Ref	Title	Due month
	Originally expected in Y4 (2021)	
D-WP1.2	Description of a common framework for OH surveillance	M54
D-WP2.2	Suggested best-practices for multi-sectorial collaboration in order to achieve OHS, hazard-specific (hazard tracks)	M54
D-WP3.1	Report on the output-based surveillance system selection methodology for each country and as many of the approaches as possible	M54
D-WP4.2	EUEpiCap tool and tutorial	M54
D-WP0.2	Data Management Plan - final	M58
D-WP0.3	Sustainability document	M58
D-WP1.3	Report on the evaluation of the common framework using examples within the consortium	M58
D-WP2.3	Common framework of OHS surveillance	M58
D-WP3.2	Combined report for all subtasks within the development of output-based metrics	M58
D-WP4.3	Report on the implementation of evaluation approaches on two studies cases	M58
D-WP5.2	OHS roadmap template document	M58
D-WP6.1	User manual for construction and implementation of OH dashboards using open source tools (source codes)	M58
D-WP6.2	A practical manual to the use of dashboards in OHS practice, including recommendations for sustainability	M58
Milestones		
Ref	Title	Due month
M-WP4.1	Deployment of the EUEpiCap survey tool in several European countries on study cases	M54
M-WP6.1	Dashboards operational within the pilot participating agencies	M54

2.4.1.1.24 JIP06- SARS-CoV2 Research Integration and Preparednes-COVRIN

Reference to the Strategic Research Agenda (please refer to D2.7)	**SRA Integrating activities, focussing on detection-/typing methods/protocols, surveillance strategies/signalling.**		
Research Project Title	**SARS-CoV2 Research Integration and Preparedness**		
Research Project Acronym	**COVRIN**		
Leading Organisation	**P31-WBVR**	Deputy Leading Organisation	**P23-UoS**
Project Leader	**Wim H.M. van der Poel**	Deputy Project leader	**Daniel Horton**
Project Start month	**M40 – March 2021**	Project End month	**M63 – March 2023**
Annual period of the OHEJP the work plan applies: Y5 and Y6			

Participant	**1**	2	**4**	6	7	**8**	**9**	**10**	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	**VRI**	**BfR**	**FLI**	**RKI**	**DTU**
PM	**28,50**		**0,35**			**1,00**	**1,90**	**8,64**		
Participant	13	14	15	**16**	**17**	18	19	20	**21**	**22**
	SSI	UT	VFL	**INIA**	**UCM**	MVNA	INRA	IP	**APHA**	**PHE**
PM				**3,00**	**0,75**				**11,19**	
Participant	**23**	24	25	26	**27**	**28**	**29**	**30**	**31**	**32**
	UoS	NNK	NUIG	TEAGASC	**ISS**	**IZSAM**	**IZSLER**	**RIVM**	**WbvR**	**FHI**
PM	**7,59**				**2,76**	**4,24**	**8,00**	**8,27**	**3,50**	
Participant	**33**	**34**	**35**	**36**	37	39	40	**41**	42	43
	NVI	**PIWET**	**INIAV**	**INSA**	IISPV	SLV	FOHM	**SVA**	NMVRVI	ISCIII
PM	**5,22**	**7,44**	**2,00**	**1,17**				**3,06**		
Participant	**44**	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM	**2,70**									

Objectives WP0

- Leading and coordination of COVRIN
- Exchange Information between COVRIN work packages
- Integration of COVRIN results
- Linking to external partners, other international projects (EU activities) and stakeholder (in particular EC, EFSA, ECDC, EMA)
- Communication about COVRIN activities and results
- Organisation of meetings of COVRIN partners
- Organisation of interactions with stakeholders
- Scoping to avoid overlaps with other (EU-funded) Covid19 activities.

Description of work

WP: 0 Coordination and communication
WP start month: 40
WP end month: 66
WP Leader: WBVR (Wim van der Poel)
WP Deputy: UoS (Daniel Horton)
WP participants: All partners of COVRIN: ANSES (P1), Ages (P2),Sciensano (P4), VRI (P8), BfR(P9), FLI (P10), INIA (P16), UCM (P17), APHA (P21), UoS (P23), ISS (P27), IZSAM (P28), IZSLER (P29), RIVM (P30), WBVR (P31), NVI (P33), PIWET (P34), INIAV (P35), INSA (P36), SVA (P41).

Short description of WP0:
Work package 0 leads and coordinates the COVRIN project. This includes organising Information flows, integration of results, active linking to external partners, projects as well as stakeholder Communication about project activities and outcomes. Organisation of meetings and a scoping to avoid overlaps with other (EU-funded) Covid19 activities.

T0.1:To manage exchange of research data and the information flow between work packages a share point for data exchange will be established. This share-point will be available for all project partners throughout the project for management of information flows and meetings organisation

T0.2: Communication about project activities and project results will be described in an annual report and an end report. These will include communications about results to the scientific community as well as the general public. WP0 will also ensure that all project reports and deliverables will be produced timely.

T0.3: A scoping exercise will be conducted to avoid overlaps with other EU funded COVID19 research activities. Three major project meetings will be organised: First, a face-to-face kick-off meeting will be held with all participants in month M42. Next, a mid-term meeting is planned for all WP-leaders and finally, the final project meeting or conference will be conducted in M63. The latter two meetings will be online or combined with other EJP meetings. Stakeholders (i.e. EC, EFSA, EMA) will be invited to participate in all project meetings.
A communication channel through REA will be established in order to inform the European Commission and EU Agencies (EFSA, ECDC and EMA) on (interim) knowledge/data.
Knowledge/data interim and final results that could serve for potential Covid19-related risk assessment and/or risk management activities, will be communicated to REA and to relevant EU stakeholders (European Commission and EU Agencies EFSA, ECDC and EMA).

Deliverables

Ref	Title	Due month
D0.1.2	First management report	M51
D0.2.1	First annual communications report	M51
D0.3.3	Report Mid-term meeting (presentations)	M57
D0.1.3	Second management report	M63
D0.2.2	Second annual communications report (end report)	M63
D0.3.4	Report Project end meeting Presentations)	M66

Milestones

Ref	Title	Due month

Objectives WP1

- To assess and assure validity of coronavirus testing
- To optimise molecular detection of SARS-CoV2
- To compare immunological testing for SARS-CoV2
- To better understand how testing relates to the potential for transmission.
- To integrate activities among partners to enhance capability for the detection of SARS-CoV-2 in potential animal hosts and environmental samples
- To determine the survival of virus in these samples from hosts and the environment.
- To assess the bioavailability of SARS-CoV2 in environmental samples to establish the role in infection in susceptible hosts.

Description of work

WP: 1 Detection of SARS-CoV2 in animal reservoirs and hosts, and the environment
WP start month: 40
WP end month: 66
WP Leader: UoS (Daniel Horton)
WP Deputy: FLI (Martin Groschup)
WP participants: ANSES (P1), Ages (P2), Sciensano (P4), VRI(P8), FLI (P10), UCM (P17), APHA (P21), UoS (P23), ISS (P27), IZSAM (P28), IZSLER (P29), RIVM (P30), WBVR (P31), NVI (P33), INIAV (P35), SVA (P41).
Short description of WP1:
Integration of studies on SARS-CoV2 detection in livestock, wildlife, pets and the environment. Optimization and harmonization of RNA and immunological detection methods for SARS-CoV-2 detection in animal and environmental samples. Definition of bioavailability of virus in fomites, water, and the environment

T1.1: SARS-CoV2 genome detection in livestock, wildlife, pets and environmental samples. Data from previous and planned testing for SARS-CoV-2 genomes in animals and in the environment will be compiled and shared (to inform surveillance in WP3). Methods in use will be assessed using published and unpublished comparisons with focus on: Comparison of extraction methods in different clinical animal samples (matrices), PCR and sequencing optimisation. Positive controls will be shared among partners and ring-trials will be organised where necessary to compare methods. These data will include opportunistic sampling in candidate species in the wild, companion animals, in captive livestock and from experimental studies

T1.2: Optimization and harmonization of immunological SARS-CoV2 antigen and antibody detection methods in domestic and wildlife animals. will be compared in terms of their sensitivity and specificity and optimized as appropriate. Matrix effects for swab samples from infected livestock and pets will be studied. Commercially available Point Of Care SARS-CoV-2 antigen tests will be included. Likewise IgM and IgG antibody tests will be compared and assessed in terms of their specificity and sensitivity.

Both study lines will include opportunistic sampling in candidate species in companion animals and in captive livestock and from corresponding experimental studies.

T1.3: Definition of bioavailability of virus in fomites, water and in the environment. This task is crucial to interpret the relevance of detecting SARS-CoV-2 in fomites and the environment but also to assess the infectivity of the virus on these substrates over time, and at different temperatures. Comparison with RNA quantification (PCR versus live virus) will inform risk assessments (in WP3).
Results are expected to include viability of live virus in field samples (water, feed, surfaces including animal fur/coats/hide etc) and from experimental studies.

Deliverables

Ref	Title	Due month
D1.1.1	Report on available data from SARS-CoV-2 virus genome testing in companion animals and livestock	M60
D1.1.2	Report on available data from SARS-CoV-2 virus genome testing in wildlife	M63
D1.3	Report on the bioavailability of virus on fomites, water and the environment	M60
D1.2.1	Report on methods for virus antigen detection in clinical samples from animals	M63
D1.1.3	Report on available data from SARS-CoV-2 genome detection in environmental samples	M66
D1.2.2	Report on available data from antibody testing in livestock, companion animals and wildlife	M66

Milestones

Ref	Title	Due month
N/A		

Objectives WP2

- To characterize SARS-CoV-2 variants
- To map evolutionary changes of SARS-CoV-2 viruses isolated within and across humans and different animal species.
- To assess the risk of zoonotic and reverse zoonotic transmission, potential immune evasion and reinfection based on virus characterizations.
- To determine changes in regions critical for vaccine development (S-gene) or antiviral medication (RdRp).
- To better understand the molecular and biochemical mechanisms underlying angiotensin converting enzyme (ACE)-2 receptor binding, pathogenesis and viral kinetics in host species. Studies in in vitro and ex vivo systems as well as in animal models will be performed.
- To optimise ex-vivo and in-vivo models available at partner institutes.
- To determine if changes in the receptor binding domain leads to alterations in replication and viral release, host cell antiviral responses or pathological effects in relevant host species.

Description of work
WP: 2 SARS-CoV2 Characterization
WP start month: 40
WP end month: 66
WP Leader: APHA (Sharon Brookes)
WP Deputy: IZSAM (Alessio Lorusso)

WP participants: ANSES (P1), FLI (P10), APHA (P21), UoS (P23), ISS (27), IZSAM (P28), IZSLER (P29), WBVR (P31), NVI (P33), PIWET (P34), INIAV (P35), SVA (P41).

Short description of WP2:
Genome analyses; Next generation sequencing of detected isolates and metagenomic sequencing of different samples. In vitro and ex vivo biological characterization of circulating SARS-CoV2 strains. Development, optimization and harmonization of animal models for SARS-CoV2 characterization. Analyses of virus traits related to zoonotic and/or reverse zoonotic transmission.

T2.1: Whole genome sequences by NGS (various methods) of SARS-CoV-2 strains from humans and animals.

a) Methodologies exchange and harmonisation

Archival samples of wild and domestic animals will be used for CoV RNA detection and NGS.

b) Sample type (clinical – field or experimental / isolate) and extraction protocols plus validation, Phylogenetic analysis and investigation for potential virulence traits will be performed.

c) Nucleic acid comparisons – both consensus and minor variant analyses.

d) Phylogenetic relationships among human and animal strains.

e) Amino acid analyses – receptor binding sites, antigenic sites etc

Selected strains may be also used for downstream biological characterization (T2.2 & 2.3).

T2.2: In vitro and ex vivo biological characterization of SARS-CoV2. Assessment of in vitro systems for characterization of SARS-CoV-2 strains. Including live virus (infectious) recovery sensitivity and species specificity:

a) Cell lines of species origin,

b) Virus Neutralisation Assays optimisation – wild type and pseudotypes

Ex vivo explants and air-liquid interphase cultures of several animal species will be infected with SARS-CoV-2:

c) Ex vivo organ cultures,

d) Air liquid interface

Viruses replicating in these systems will be characterized with respect to genome analysis, viral growth and host responses

T2.3: Development, optimization and harmonization of animal models for SARS-CoV2 characterization. Animal models species type for veterinary health and animal models for human disease including zoonoses.

a) Exchange of protocols and experimental designs (infection, transmission, therapeutic intervention etc)

b) Explore and share pathology parameters (virus, receptors etc).

c) Undertake host response and cellular biomarkers analyses – innate and adaptive (humoral and cellular).

T2.4: Analyses of virus traits related to zoonotic and/or reverse zoonotic transmission
Outcomes and materials from this WP tasks and other WPs will allow:

a) Variant analyses on host species change progeny viruses

b) Host cell ACE2 receptor virus interaction analyses.

c) Antigenic site modifications determination including cartography.

d) A variant virus in vivo investigation.

Deliverables

Ref	Title	Due month

D2.2.2	Report on assessment of VNA techniques and comparison with ELISA reactivity data.	M51
D2.3.2	Report on pathology per species and investigative toolboxes.	M51
D2.1.3	Report on the development of an algorithm for novel virus assessment.	M54
D2.4.1	Collated partner outcomes of virus trait change as a result of species change including cell receptor affinity	M54
D2.2.3	Report on complex culture viral characterisation.	M57
D2.4.2	Report on in silico and antigenic cartography analysis of antigenic site adaptation traits.	M57
D2.3.3	Report on virus-host interaction parameters across susceptible species.	M60
D2.4.3	Undertake and report on a virus variant in vivo follow-up study.	M60
Milestones		
Ref	Title	Due month

Objectives WP3

- To integrate the currently fragmented data from sampling of animals and the environment (WP1) across partner countries, into an aligned One-Health surveillance system for SARS-CoV-2
- To combine aligned surveillance with the data on bioavailability in samples (WP1) to inform risk assessment and transmission models.
- To use WP3 outcomes to provide evidence for decision makers and other stakeholders to understand the risk posed by potential animal hosts, the environment, or fomites in the transmission of SARS-CoV-2.

Description of work

WP: 3 SARS-CoV2 risk assessment and surveillance
WP start month: 40
WP end month: 66
WP Leader: Joaquin Prada (UoS)
WP Deputy: Mirjam Kretzschmar (RIVM)
WP participants: ANSES (P1), Ages (P2), Sciensano (P4), VRI (P8), FLI (P10), INIA (P16), UCM (P17), APHA (P21), UoS (P23), ISS (27), IZSAM (P28), IZSLER (P29), RIVM (P30), WBVR (P31), NVI (P33), PIWET (P34), INIAV (P35), INSA (P36), SVA (P41).

Short description of WP3:
Integration of surveillance activities in wildlife, food producing animals, pets and the environment (incl. sewage). Mapping of surveillance data obtained from wildlife, food producing animals, pets and the environment (incl. sewage). Identifying risk factors for virus transmission in wildlife reservoirs, food producing animals and the environment. Establishing models for transmission routes and risk assessment in a One health perspective.

T3.1: Integration of surveillance activities. Design of a format/procedure for sampling/surveillance data on wildlife, food producing animals, pets, and the environment, from partner institutes, suitable to inform risk assessment.
Collection of sampling/surveillance data from partner institutes and integration in the common framework.
Investigation to identify additional sources of data (existing and novel) across the partner countries, and integration into the common framework when possible.

T3.2: Mapping of surveillance data
Evaluation of current surveillance activities being carried out, particularly in the animal sector, and assessment of similarities and differences between member countries, as well as opportunities for alignment. Identification of key stakeholders at national level needed to be involved for a successful implementation of One Health surveillance activities across member states.

T3.3: Risk factors for virus transmission
Conduction of an epidemiological survey to analysis the transmission of SARS-CoV-2 in both heavily and normally exposed pets (i.e. healthcare personal households and "normal" households, respectively). Sampling both heavily and normally exposed pets. Diagnosis of infections with SARS-CoV-2 using PCR-ELISA. Identification of potential risk factors for pet-human transmission of SARS-CoV-2.

T3.4: Models for transmission routes and risk assessment in a One Health perspective
Overview of different dynamics models and required parameters to test hypotheses regarding the role of animals as potential reservoir hosts and parameters needs. Systematic review to collect data on transmissibility of SARS-CoV2 of different animal hosts. This review will mainly target published and grey experimental data. Expected outputs from this review are quantification of transmission parameters characterising direct contact and if possible indirect transmission (contribution of the environment, including survival data generate by WP1). Assess susceptibility of different animals hosts by assessing collected data on sampling of wildlife, livestock, pets, and systematic review of challenge and dose-response experiments. Data collection on the mink outbreaks and assessment of transmission: mink-to-mink, between mink farms and mink-to-humans.

Deliverables

Ref	Title	Due month
D3.4.5	Report describing the transmission characteristics of the mink outbreaks for the countries where data was available.	M51
D3.1.2	Database on sampling on wildlife, food producing animals, pets, and the environment.	M54
D3.3.1	Report on epidemiological survey design and clinical data (including anamnesis and lab results).	M54
D3.4.2	Systematic review report and quantification of transmission parameters for different animal species.	M54
D3.1.3	Report on the investigation and possibilities of integration.	M57
D3.4.3	List of susceptible hosts and relative risk ranking of susceptibility	M60
D3.2.2	Report on key stakeholders across member countries and opportunities for alignment of One Health surveillance activities	M63
D3.3.2	Report on the epidemiological survey results and risk factor assessment for pet-human SARS-Cov-2 transmission.	M63
D3.4.4	Report on SR of challenge experiments using different host species	M66

Milestones

Ref	Title	Due month

Objectives WP4

- To study virus-host interactions of other coronaviruses to better understand which determinants are critical for infection of humans or susceptible animal species in particular (*Felidae, Mustelidae, Cricetidae* etc.)

- To identify possible molecular mechanisms of evolution and host adaptation by investigating adaptive potential of different relevant animal CoVs from different genera under natural and experimental conditions.
- To study the drivers of coronavirus emergence to enhance preparedness.
- To assess which coronaviruses have the greatest potential for cross-species interactions through study of genetic diversity and global scale phylodynamics
- To early identify zoonotic and reverse zoonotic adaptations in order to raise preparedness by highlighting ecological opportunities and human practices that have a direct impact on coronaviruses evolution in animals and in the vicinity of humans.
- To model coronavirus emergence risks in different virus-host interaction situations. Increased knowledge of the risk of virus emergence in specific situations will be very helpful for trying to control such risks.

Description of work

WP: 4 Coronavirus preparedness
WP start month: 40
WP end month: 66
WP Leader: (ANSES) (Nicolas Eterradossi)
WP Deputy: WBVR (Wim van der Poel)
WP participants: NSES (P1), VRI (P8), Bfr (P9), FLI (P10), APHA (P21), ISS (27), IZSAM (P28), IZSLER (P29), WBVR (P31), PIWET (P34), INIAV (P35); Associated expert CHU Caen

Short description of WP4:
Study of virus – host interactions, looking into virus evolution and host adaptation. Identifying drivers of virus emergence through evaluation of phylodynamics and cross-species interactions with focus on zoonotic and reverse zoonotic aspects and adaptations. Use of generated data and research outcomes for virus emergence risk modelling to improve surveillance and control strategies, intervention strategies and prevention.

T4.1: Virus-host interaction
a) Inoculation studies using different coronaviruses (Besides beta-Coronaviruses, gamma-Coronaviruses like IBV, TcoV and GfCoV may be used) i.e with a common genetic backbone but different S genes in SPF poultry. Viruses isolated from heterogenous host will be passaged.
b) Recombination studies between coronaviruses of the same genus (for experimental models and different viruses – e.g. from wild rodents – in cell cultures or ex vivo) to assess frequency and strain specificity of these events.
c)Isolation attempts of betacoronavirus detected in hedgehogs and other wildlife species to explore the possibility of a cross-species transmission to humans by using animal models of Covid-19 (i.e. hamsters and/or ferrets)

T4.2: Drivers of virus emergence
Analyses of genetic diversity and global scale phylodynamics of coronaviruses of domestic animals and wildlife.
a) to reconstruct the phylodynamics of these viruses at global time and geographical scales, within and between both species and breeding facilities.
b) to trace relevant virus mutations and recombination events
c) to assess the impact of ecological factors (species interactions, habitat, etc) and human interventions (vaccination, trading of animals, etc.) on coronaviruses evolution (rates, composition of recombinants, potential contribution of vaccine strains) and spread (transmission chain between breeding facilities, detection of focal points or super spreaders).
Aim for a One Health approach for pandemic preparedness.
T4.3: Virus emergence risk modelling

Collecting data from specific animal communities over a pre-defined period of time: a) by high frequency sampling of bats and cats in a natural or domestic environment over a period of time b) by taking monthly fecal samples from cats and kittens housed under breeding farm conditions c) by frequent sampling of wildlife including hedgehogs hosted in animal health centres for several months and taking into account the results of tasks 4.1 and 4.2, the potential impact on other species incl. humans' will be inferred.		
Deliverables		
Ref	Title	Due month
D4.2.2	Report on harmonized methods for coronavirus detection and metagenomic sequencing and detected coronavirus genomes.	M51
D4.1.1	Reports of in vivo and in vitro experimentations	M57
D4.3.1	Report on relevant sample types	M60
D4.1.2	Full-length genomes of viruses from a, b and c	M63
D4.2.3	Report of analyses of detected variations in Coronavirus sequences related to ecological factors and human interventions.	M63
D4.3.2	Report of pan coronavirus PCR screening, plus next generation sequencing of samples and viral diversity over time.	M63
D4.3.3	Report of coronavirus contaminations in wildlife species.	M66
Milestones		
Ref	Title	Due month
M4.1	In vitro and in vivo experiments performed	M54
M4.2	Samples collected under farming and natural conditions	M57
M4.3	Coronavirus evolution under experimental and natural conditions analyzed	M63
M4.4	impact on the capacity to cross the species barrier evaluated and risk modelized	M66

2.4.1.1.25 PhD01-R1-AMR2-ECO-HEN

Reference to the Stategic Research Agenda (please refer to D2.7)	**AMR 2: Epidemiological studies into the dynamics of AMR in human and animal populations and the environment including horizontal gene transfer and selection of AMR**		
PhD Project Title	**Investigate the gaps in the transmission dynamics of AMR *E. coli* in commercial laying hen production**		
PhD Project Acronym	**ECO-HEN**		
PhD Supervising Organisation	**P17-UCM**	Deputy PhD Supervising Organisation	**P12-DTU**
PhD Supervisor	**Miguel A. Moreno**	Deputy PhD Supervisor	**Pimlapas Leekitcharoenphon**
PhD Start month	**M14**	Project End month	**M49**

Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	**17**	18	19	20	21	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	IP	APHA	PHE
PM					**1,00**					
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Reveal to what extend the table egg production system represents a risk for spread of AMR to humans and the environment.
- Effect of reduced antimicrobial use in the production animals on the AMR bacteria initially present in one-day chicks.

Description of work

WP: **WP9. Writing of PhD thesis**.
WP start month: M49
WP end month: M49
WP Leader: M.A. Moreno (UCM)
Deputy WP Leader: P. Leekitcharoenphon (DTU)
WP participants: UCM, DTU
Description of the WP: This WP is devoted of the preparation of the doctoral thesis dissertation.

Deliverables

Ref	Title	Due month
D-E14-9.1.	Doctoral thesis draft	49

Milestones

Ref	Title	Due month
N/A		

2.4.1.1.26 PhD02-R1-AMR2/3/6-LIN-RES

PhD to be finalised in Y4 (M48)

2.4.1.1.27 PhD03-R2-AMR2.1-HME-AMR

Reference to the Strategic Research Agenda (please refer to D2.7)	**AMR2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer in humans, animals and the environment, including epidemiology of resistant microorganisms and antimicrobials in the environment and their (environment-mediated) spread**		
PhD Project Title	**Investigating the role of heavy metals in the environment as a selective pressure for the dissemination of antimicrobial resistance**		
PhD Project Acronym	**HME-AMR**		
PhD Supervising Organisation	**P26-TEAGASC**	Deputy PhD Supervising Organisation	**P25-NUIG**
PhD Supervisor	**Kaye Burgess**	Deputy PhD Supervisor	**Dearbháile Morris**
PhD Start month	**M38**	PhD End month	**M74 (M69 with OHEJP)**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	**26**	27	28	29	30	31	32
	UoS	OKI	NUIG	**TEAGASC**	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM			0.5	**9,00**						
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						

	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- to complete the analysis of the bacterial isolates and resistome in zinc amended and non-amended soil obtained from the same sites and isolates from food crops grown on amended soil.
- to collect milk filters from cows grazing in high and low zinc areas and analyse the resistome.

Description of work

Selective pressures drive bacterial populations to evolve and may promote the dissemination of AMR genes, in the human and animal gut, or in the environment. However, there is limited information about the impact of selective pressures in the agri-food environment on HGT between microorganisms. One of the factors which can act as a selective pressure and can influence this HGT is the presence of heavy metals. Heavy metals occur ubiquitously in the agri-food environment and sometimes in high concentrations in soil. Very limited information is available regarding the impact of selective pressures such as heavy metals which may be present in the environment on the mobilisation of antimicrobial resistance and its potential transfer into the food chain.

Work on the amendment trial which started in Y4 will continue in this period, focused on antimicrobial and heavy metal susceptibility testing of isolates obtained from the trial and completion of the metagenomics analysis, focusing on comparing the resistome between amended and non-amended plots.

For the milk filter analysis culture based analysis will screen for the presence of extended-spectrum beta-lactamase producing *Enterobacteriaceae,* fluoroquinolone resistant *Enterobacteriaceae* and carbapenemase producing *Enterobacteriaceae* on selective agars, using methodologies in place. Isolates will be identified by MALDI-TOF and screened for resistance to a panel of antimicrobials and heavy metals. A representative sample set will be utilised in a shotgun metagenomic study to characterise the wider resistome.

Deliverables

Ref	Title	Due month
D-PhD03-1.1	Report on AMR bacteria present in soils of differing heavy metal content	M60
D-PhD03-1.2	Report on the impact of the application of heavy metal containing amendments to AMR bacteria in soil	M54
D-PhD03-1.3	Report on AMR bacteria present in milk filters from animals grazing in areas of differing heavy tal content	M66

2.4.1.1.28 PhD04-R2-AMR2.1-KENTUCKY

Reference to the Stategic Research Agenda (please refer to D2.7)	**AMR 2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer in humans, animals and the environment, including epidemiology of resistant microorganisms and antimicrobials in the environment and their (environment-mediated) spread**			
PhD Project Title	**Exploring the evolutionary success of the antibiotic resistant Salmonella Kentucky ST198**			
PhD Project Acronym	**KENTUCKY**			
PhD Supervisor	**P4-Sciensano**	Deputy PhD Supervising Organisation	**P19-INRA**	
PhD Coordinator person name	**Pieter-Jan Ceyssens**	Deputy PhD Supervisor	**Benoit Doublet**	
PhD Start month	**M30**	PhD End month	**M58**	
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)				

Participant	1	2	**4**	6	7	8	9	10	11	12
	Anses	Ages	**Sciensano**	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM			**8,00**							
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

Salmonella enterica serovar Kentucky (*S.* Kentucky) is a common causative agent of gastroenteritis in humans. It is one of most notorious *Salmonella* serotypes, as it is strongly associated with antimicrobial resistance (AMR).

In this project, we will investigate (i) what explains the evolutionary success of the multidrug resistant S. Kentucky ST198 clone, (ii) what is the mechanisms of the integration (and potential further transfer) of the ESBL gene in its chromosome, and (iii) Are there genetic determinants of different human-animal host ranges in epidemic S. Kentucky ST198 and ST152?

Description of work:

In the third year (Y5) of the PhD project, the focus will be on further elucidation of in the molecular mechanisms behind the chromosomal transfer of the IS_{ECP1}-CTX-M mobile element in S. Kentucky and its clinical importance among other *Enterobacteriacea*e, which focuses strongly on objectives 1 and 2 of the PhD description. To this end, we will:

1. Mine databases of sequenced genomes for the occurrence of this transfer the genetic construct among clinically isolated *Enterobacteriacea* (with focus on E. coli, K. pneumoniae and S. enterica), and determine in silico whether these elements are located on mobile elements (plasmids) or on the chromosome.
2. Expand experiments with the reported plasmidic construct, exploring conjugation and transfer efficiencies in other serotypes of Salmonella during a research visit at INRAE.
3. Further explore *in vitro* fitness and growth kinetics in different media using high-throughput genotype-phenotype screens (e.g. phenotypic microarrays such as BioLog), allowing the characterization of phenotypes related to transfer of resistance genes between chromosome and plasmid.

Deliverables

Ref	Title	Due month
D6	Paper 2 (Tentative title). Characterization of factors influencing the transfer of ESBL genes from plasmid to chromosome	M57
D7	Paper 3 (Tentative title). The prevalence of ISecp-1 mediated transfer of ESBL genes to the chromosome among clinically isolated Enterobacteriacea	M57

Milestones

Ref	Title	Due month
M5	Research visit to INRAE	M52

2.4.1.1.29 PhD05-R2-AMR2/6.1/ET5-METAPRO

Reference to the Stategic Research Agenda (please refer to D2.7)	**AMR 2: Epidemiological studies into the dynamics of AMR in human and animal populations and the environment including horizontal gene transfer and selection of AMR** **AMR 6.1: Development of NGS-based tools for surveillance of AMR in Enterobacteriaceae in animals, humans and the environment** **ET 5: Ecology of emerging pathogens**		
PhD Project Title	**Metagenomics and genomic approaches for the prevention of the spread of plazomicin resistance in humans, animals and the environment**		
PhD Project Acronym	**METAPRO**		
PhD Supervising Organisation	**P17-UCM**	Deputy PhD Supervising Organisation	**P23-UoS**
PhD Supervisor	**Bruno Gonzalez Zorn**	Deputy PhD Supervisor	**Roberto La Ragione**
PhD Start month	**M27**	PhD End month	**M60**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	**17**	18	19	20	21	22
	SSI	UT	VFL	INIA	**UCM**	MVNA	INRA	IP	APHA	PHE
PM					**16,00**					
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						

	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives:

- Development of a guideline for early detection of plazomicin resistance determinants to preserve plazomicin for human clinical use.
- Thesis writing and defense.

Description of work:

The bioinformatical analyses of the genomic and metagenomic data from the second sampling will be performed and the differences between samplings will be connected. The guideline for early detection of plazomicin resistance determinants to preserve plazomicin for human clinical use will be composed.

The thesis manuscript will be written, as well as a potential article manuscript with the results obtained.

Deliverables

Ref	Title	Due month
	Guideline for early detection of plazomicin resistance determinants to preserve plazomicin for human clinical use	SEP 2022
	Thesis	DEC 2022

Milestones

Ref	Title	Due month
	Guideline for early detection of plazomicin resistance determinants to preserve plazomicin for human clinical use	SEP 2022
	Thesis manuscript	DEC 2022
	Thesis defence	FEB 2023

2.4.1.1.30 PhD06-R1-ET5-PEMbo

Reference to the Stategic Research Agenda (please refer to D2.7)	**ET 5: Ecology of emerging pathogens**		
PhD Project Title	**From genotype to phenotype: patho-evolution of French strains of *Mycobacterium bovis*.**		
PhD Project Acronym	**PEMbo**		
PhD Supervising Organisation	**P1-ANSES**	Deputy PhD Supervising Organisation	**N/A**
PhD Supervisor	**Boschiroli Maria Laura**	Deputy PhD Supervisor	**N/A**
PhD Start month	**M22**	Project End month	**M58**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	**1**	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM	**9,00**									
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- Obtaining reference sequences by Illumina / PacBio sequencing of strains belonging to main clonal groups
- Identification of genomic events (insertion / deletion or broad sequence polymorphism (LSP)) by comparison study of genetic variation: analysis focused on the study of 182 virulence genes, genes involved in envelope biosynthesis and the study of excreted antigens.
- Study of the antigenic variation: biochemical and lipidomic analyses of the strains

Description of work

WP3: Analysis of the antigenic variability: biochemical and lipidomic studies
WP3 start month: M21
WP3 end month: M30
WP3 Leader: Biet Franck
Deputy WP3 Leader: Boschiroli Maria Laura
WP3 participants: PhD student, Thierry Cochard
Description of the WP3: The strains selected according to their potential for antigenic variation (WP2) and their epidemiological characteristics will be analysed by biochemical approaches.

Task-3.1: Protein profiles determination
Task-3.1 start month: M21
Task-3.1 end month: M30
Task-3.1 Participants: PhD student, Thierry Cochard
Description of the task-3.1: analysis of protein profiles by SDS PAGE Western blot using a collection of sera from animals of different infectious status

Task-3.2: Lipidomic analyses
Task-3.2 start month: M21
Task-3.2 end month: M30
Task-3.2 Participants: PhD student, Thierry Cochard
Description of the task-3.2: lipid analyses by thin layer chromatography coupled with mass spectrometry analyses.

WP4: Valorisation and dissemination of results
WP4 start month: M17
WP4 end month: M36
WP4 Leader: Boschiroli Maria Laura
Deputy WP4 Leader: Lorraine Michelet
WP4 participants: PhD student
Description of the WP4: This WP is dedicated to the dissemination of all the results obtained in the other WPs to the scientific community, either by the publication of scientific papers in international open access journal or by the participation at international scientific meetings. Writing of the PhD manuscript is the final step of the project.

Task-4.1: Publication of results
Task-4.1 start month: M21
Task-4.1 end month: M36
Task-4.1 Participants: PhD student
Description of the task-4.1: writing of scientific papers for publication in international open access journal and publication of genomic data

Task-4.2: Communication

Task-4.2 start month: M17 Task-4.2 end month: M34 Task-4.2 Participants: PhD student Description of the task-4.2: Participation at international congress to present the results of different WP Task-4.3: PhD manuscript redaction Task-4.3 start month: M31 Task-4.3 end month: M36 Task-4.3 Participants: PhD student Description of the task-4.3: PhD manuscript writing		
Deliverables		
Ref	Title	Due month
D-E5-5	Final steering committee ●	M42
D-E5-6	Oral communication at a congress ♦	M46
D-E5-7	Publication in an international journal ■	M46
D-E5-8	PhD manuscript ■	M48
Milestones		
Ref	Title	Due month
M-E5-8	Protein profiles	M42
M-E5-9	Lipidomic profiles	M42

2.4.1.1.31 PhD07-R2-ET2.1-MACE

Reference to the Stategic Research Agenda (please refer to D2.7)	**ET 2.1: Evaluation of early detection methods for emerging threats**		
PhD Project Title	**Mathematical models and economic evaluation for cystic echinococcosis control and elimination**		
PhD Project Acronym	**MACE**		
PhD Supervising Organisation	**P23-UoS**	Deputy PhD Supervising Organisation	**P27-ISS**
PhD Supervisor	**Joaquin Prada**	Deputy PhD Supervisor	**Adriano Casulli**
PhD Start month	**M25**	PhD End month	**M60**

Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	**23**	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM	**13,00**									
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

1) Understand what surveillance and control options would stakeholders be more willing to support
2) Assess the most plausible and feasible CE control and elimination scenarios

Description of work:

Stakeholder support will be informed by modelling risk aversion, loss aversion, probability weighing and willingness to pay. For risk preference elicitation we will apply a descriptive framework, grounded in prospect theory (PT), for the evaluation of risk preferences of decisions on CE surveillance and control. Via an online poll, deployed across the One Health community in South America working on zoonotic diseases, we will elicit PT preferences, specifically stakeholders' attitudes towards gains, losses and probabilities (i.e. if they overweight or underweight extreme probabilities) by means of a series of standard lotteries or choice lists. Moreover, we will also estimate the stakeholders' willingness to pay for improvements in CE surveillance and control measures. Our results will quantify the effect of several cognitive biases that may alter the uptake of interventions.

The quantification of risk aversion from our PT models will be formally inputted in our economic evaluations, for a country in South America (i.e. Uruguay) and in East Europe (i.e. Albania), to relax the default and unrealistic assumption of risk-neutral decision makers. This step will integrate our different efforts (mathematical models, economic evaluation, and risk preference elicitation) to inform the true effectiveness of interventions.

Deliverables

Ref	Title	Due month
MACE.Y5.1	Final draft on economic analysis	M60
MACE.Y5.2	Final draft on risk preference evaluation	M60
MACE.Y5.3	CE model integrating surveillance, control, economic evaluation and risk preference	M60
MACE.Y5.4	Final report to stakeholders	M60

Milestones

Ref	Title	Due month
MACE.Y5.A	Online polls with stakeholders completed	M53
MACE.Y5.B	Online interviews	M50

2.4.1.1.32 PhD08-R2-ET5.1/4.1/FBZSH3-DESIRE

Reference to the Stategic Research Agenda (please refer to D2.7)	**ET 5.1: The role of wildlife in the ecology of potentially zoonotic emerging threats ET 4.1: Host factors associated with increased susceptibility to infection and disease of emerging threats with undefined routes of transmission FBZ-SH 3: Source attribution of bacterial foodborne zoonoses and antimicrobial resistance considering also the environment and non-livestock reservoirs (e.g. pets and wildlife) as sources**		
PhD Project Title	**Developing Evidence-based Surveillance for emergIng Rat-borne zoonoses in changing Environments**		
PhD Project Acronym	**DESIRE (Developing Evidence-based Surveillance for emergIng Rat-borne zoonoses in changing Environments)**		
PhD Supervising Organisation	**P30-RIVM**	Deputy PhD Supervising Organisation	**P31-WbvR**
PhD Supervisor	**Miriam Maas**	Deputy PhD Supervisor	**Wim van der Poel**
PhD Start month	**M22**	PhD End month	**M68**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	**30**	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	**RIVM**	WbvR	FHI
PM								**0,00**		
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										

Participant	44 BIOR	45 RUOKA	46 THL	47 NEBIH						
PM										

Objectives

The field studies will be finalised before this year. Samples from the collected animals will be analysed. Models are developed to perform the various analyses of the collected data.

Description of work:

1) The PhD candidate will perform a genetic analysis on samples collected from rats in different urban areas to assess their genetic diversity. This can be used as a proxy for contact between different populations, which then can inform us about pathogen transmission between populations.

2) The field study is finalized. The molecular epidemiology of the pathogens will be described. Time will be spent in the laboratories of partners for the testing of samples.

3) A peer-reviewed publication will be written assessing the effects of green urban areas on the rat population and on the carriage of zoonotic pathogens.

The PhD candidate will join the Wageningen University International graduate school for Animal Sciences (WIAS) for courses and training.

Deliverables

Ref	Title	Due month
NEW (instead of D2)	An international, peer reviewed publication about genetic relationship of rat populations in urban areas	Dec (M60)
D5	An international, peer reviewed publication about the effect of city greening on rat populations and related public health risks.	September (M45)
D7	Oral or poster presentation on a One Health conference	September (M57)

Milestones

Ref	Title	Due month
N/A		

2.4.1.1.33 PhD09-R2-FBZSH3/AMR2.1-UDOFRIC

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ-SH 3: Source attribution of bacterial foodborne zoonoses and antimicrobial resistance also considering the environment and non-livestock reservoirs (e.g. pets and wildlife) as sources.** **AMR2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer in humans, animals and the environment, including epidemiology of resistant microorganisms and antimicrobials in the environment and their (environment-mediated) spread**		
PhD Project Title	**Understanding the development of fluoroquinolone (FQ) resistance in *Campylobacter* present in broilers and the risks of FQ resistance persisting through the food-chain to cause disease in people**		
PhD Project Acronym	**UDoFRiC**		
PhD Supervising Organisation	**P21-APHA**	Deputy PhD Supervising Organisation	**P1-ANSES**
PhD Supervisor	**John Rodgers**	Deputy PhD Supervisor	**Isabelle Kempf/Katell Rivoal**
PhD Start month	**M27**	PhD End month	**M62**

Annual period of the OHEJP the PhD work plan applies:

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	**21**	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	PHE
PM									**12,00**	
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII

PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

This project will exploit archives of *Campylobacter* and associated information (phenotypic, genomic, epidemiological meta-data) from surveillance and research across the food-chain to investigate the development and diversity of FQ resistance. The study will assess *in vitro* and *in vivo* biological fitness costs/benefits of resistance and determine if any specific FQ resistance variants found in poultry are more or less likely to persist and cause disease in people. Genomic analysis approaches, such as whole genome sequencing, will be used alongside microbiological and epidemiological methods in this project.

Description of work

Characterisation of historic surveillance data. Student will collate and update historic surveillance data from the national surveillance archives and identify data gaps. The student will then work to update these data gaps and bring all data in line with experimental techniques such as whole genome sequencing (WGS) and minimal inhibition concentration assays (MIC). Once all data has been brought together work will be carried out to best describe temporal trends in the data and identify any common factors associated with FQ resistance.

Whole genome sequencing (WGS) and bioinformatics training. The student will be trained in the latest methodologies in WGS and bioinformatics to identify genes associated with resistance and the effect that resistance has upon the overall fitness and persistence throughout the food chain of *Campylobacter* by comparing resistant and sensitive strains. Isolates from key periods of time in the history of FQ use will be selected from the database that spans back over 25 years.

***In vivo* and *in vitro studies*.** From September 2021 until September 2022 the project will be carried out at ANSES in France in order to carry out *in vivo* and *in vitro* fitness studies[8] to determine the effect of FQ resistance on *Campylobacte*r in order to better understand how resistance is able to persist despite the lack of specific selective pressures through changing FQ use.

Other training and development. Throughout the PhD there will be opportunities for numerous presentations and conference attendance (One Health EJP annual scientific conference and CHRO2022) to develop skills and understand the impact of the study in the context of the broader scientific community.

Deliverables

Ref	Title	Due month
D-PhD09-1.1	Completion of 9-month review	M33
D-PhD09-1.2	Literature review of FQ in Campylobacter	M37
D-PhD09-1.3	PhD Annual review	M38
D-PhD09-2.1	Description of the diversity of FQ resistance and acquisition of resistance variants over time.	M41
D-PhD09-2.2	Report on the relationship between WGS and phenotype.	M42
D-PhD09-2.3	GWAS studies and identification of strains for fitness trials	M45
D-PhD09-3.1	In vivo selection and characterization of isogenic resistant strains	M50
D-PhD09-3.2	In vitro fitness study: competition growth assays and growth kinetics	M52
D-PhD09-3.3	In vitro fitness study: comparison of survival on abiotic surfaces and on food matrices (e.g. chicken skin model)	M54

D-PhD09-3.4	In vivo study: comparison of colonisation using chicken models	M57

2.4.1.1.34 PhD10-R2-FBZSH3/AMR2.1-WILBR

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ-SH 3: Source attribution of bacterial foodborne zoonoses and antimicrobial resistance. AMR 2.1: Dynamics of AMR selection, clonal spread and horizontal gene transfer.**									
PhD Project Title	**Contribution of wild birds to AMR in the environment and on farm.**									
PhD Project Acronym	**WILBR**									
PhD Supervising Organisation	**P21-APHA**				Deputy PhD Supervising Organisation			**P41-SVA**		
PhD Supervisor	**Muna Anjum**				Deputy PhD Supervisor			**Stefan Borjesson**		
PhD Start month	**M21**				PhD End month			**M67**		
Annual period of the OHEJP the PhD work plan applies								**Y5-2021**		
Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	**21**	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	**APHA**	PHE
PM									**14,90**	
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	38	39	40	41	
	NVI	PIWET	INIAV	INSA	IISPV	IC	SLV	FOHM	SVA	
PM										

Objectives for Y3 of PhD:

1) **Collection of microbiological samples for longitudinal study**
   Collection of faecal samples from pigs and gulls will provide insight into each species microbiome as we can isolate bacteria from the samples and carry out phenotypic and genotypic testing to identify levels of AMR in the populations.
2) **Molecular analysis of bacterial isolates and antimicrobial resistance**
   Molecular analysis of isolates will allow bacterial species to be identified and any resistance profiles to be established. Comparisons can then be drawn between isolates from pigs, and isolates from gulls.
3) **Characterisation of mobile elements transmitting/proliferating AMR.**

Further characterisation will make it possible to identify if any of the antimicrobial resistance genes are mobile, and if so which mobile genetic elements (MGE) they are located on. Carrying out this analysis on pig and gull isolates would allow us to see if any MGEs are being found in both populations, inferring a transfer of resistance.

Description of work:

1) **Collection of microbiological samples for longitudinal study**
   The farms successfully recruited for the longitudinal study will be visited twice and an as of yet undecided number of pig faecal samples will be collected. In collaboration with the wildlife team based at Sand Hutton (York) gull faeces will be identified from the environment and collected.
2) **Molecular analysis of bacterial isolates and antimicrobial resistance.**
   Enterobacteriaceae will be isolated from faecal samples collected using selective media. Isolates will undergo short-read sequencing and analysed using several bioinformatics programmes and pipelines to identify species and the presence of AMR determinants.
3) **Characterisation of mobile elements transmitting/proliferating AMR.**
   Further bioinformatics analysis will help identify any MGEs. Long-read sequencing of any isolates harbouring resistance to critically important antibiotics on MGEs or multi-drug resistant MGEs can undergo long-read sequencing in order to circularise any plasmids.

Deliverables

Ref	Title	Due month
1	Completion of 9 month review	M57
2	Completion of 12 month review	M60

Milestones

Ref	Title	Due month
1	Collection of microbiological samples for longitudinal study	M56
2	Molecular analysis of bacterial isolates and antimicrobial resistance	M60
3	Characterisation of mobile elements transmitting/proliferating AMR	M60
4	Completion of 9 month review	M57
5	Completion of 12 month review	M60

2.4.1.1.35 PhD11-R1-FBZ4/5- EnvDis

Reference to the Strategic Research Agenda (please refer to D2.7)	**FBZ 4: Source attribution and transmission routes FBZ 5: Epidemiological studies: risk factors and dynamics**		
PhD Project Title	**Environment and Foodborne Zoonosis: Linking Mechanism and Phenomenology**		
PhD Project Acronym	**EnvDis**		
PhD Supervising Organisation	**P23-UoS**	Deputy PhD Supervising Organisation	**P23-UoS**
PhD Supervisor	**Giovanni (Gianni) Lo Iacono**	Deputy PhD Supervisor	**Alasdair (Alex) Cook**
PhD Start month	**M25**	Project End month	**M60**

Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	**23**	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM	**12**									
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- **O1.** Can we identify and access "big data" – existing information that can be interrogated to yield new evidence for decision-making in One Health? The generation of new analytical approaches would provide tools that could then be adapted to specific animal or human health issues where environment plays a key role in aetiology.
- **O2.** Can we identify the key environmental processes triggering and propagating zoonoses?
- **O3.** Can we disentangle the role of animal, human (including socio-economic factors) and environmental factors in zoonoses?
- **O4.** Can we identify the delay between variations in the environment (e.g. increase in the temperature or behavioural change) and the occurrence of a foodborne outbreak?
- **O5.** How can we quantify their impact on Animal and Public Health?

Description of work

WP1
WP start month: January 2020 (25M)
WP end month: December 2022 (60M)
WP Leader Gianni Lo Iacono
Deputy WP Leader: Alex Cook
WP participants-PhD Student: Laura Gonzalez Villeta
Description of the WP:
To develop a general tool to assess the risk of infectious diseases (in particular zoonosis) when we have information of relevant environmental factors.

T-1-1: Test and discuss findings of the model for salmonellosis; validate the model with data from another European country; include animal role in the model from available data; write up thesis.
Task start month: 25M
Task end month: 60M
Task Leader: Gianni Lo Iacono
Deputy Task Leader[iii]: Alex Cook
Task Participants: Laura Gonzalez Villeta, Alex Cook, Gianni Lo Iacono
Description of the task: Laura will get the data for England and Wales from collaborators at PHE, the environmental data from the MetOffice and Copernicus, animal data from Defra and APHA, previous laboratory findings to build up the model from the literature and salmonellosis data from another European country willing to collaborate, potentially under a OHEJP STM.

sT-1-1.1: Test and discuss findings of the model for salmonellosis
Sub-Task start month: 37M
Sub-Task end month: 48M
Sub-Task Leader: Gianni Lo Iacono
Deputy Task Leader: Alex Cook
Task Participants: Laura Gonzalez Villeta, Alex Cook, Gianni Lo Iacono

sT-1-1.2: Validate the model with data from another European country; include animal role in the model from (if) available data
Sub-Task start month: 49M
Sub-Task end month: 54M
Sub-Task Leader: Gianni Lo Iacono
Deputy Task Leader: Alex Cook
Task Participants: Laura Gonzalez Villeta, Alex Cook, Gianni Lo Iacono

sT-1-1.3: Write up thesis
Sub-Task start month: 55M

Sub-Task end month: 60M Sub-Task Leader: Gianni Lo Iacono Deputy Task Leader: Alex Cook Task Participants: Laura Gonzalez Villeta		
Deliverables		
Ref	Title	Due month
D-PhD11-1.1	Presentation of findings (e.g. conferences, internal school seminars)	M36
D-PhD11-1.2	End of Year Confirmation Report	M36
D-PhD11-1.3	Completion/Submission of thesis	M60
Milestones		
Ref	Title	Due month
M-PhD11-1	Test and discuss findings of the model for Salmonellosis	M48
M-PhD11-2	Validate the model with data from another European country	M55
M-PhD11-3	Write up thesis	M60

2.4.1.1.36 PhD12-R2-FBZSH9-AptaTrich

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ**		
PhD Project Title	**Development of an aptamer-based test for *Trichinella* detection**		
PhD Project Acronym	**AptaTrich**		
PhD Supervising Organisation	**P1-ANSES**	Deputy PhD Supervising Organisation	**P9-BfR**
PhD Supervisor	**Gregory Karadjian**	Deputy PhD Supervisor	**Anne Mayer-Scholl**
PhD Start month	**M22**	PhD End month	**M58**

Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)

Participant	**1**	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM	**12,00**									
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

- To test the efficiency of the developed diagnostic test on samples

- Redaction of a scientific article on the development and the use of an aptamer-based diagnostic test for Trichinella
- PhD Redaction and defence

Description of work

The work during this year will be performed at BfR and Anses laboratories.
The limit of the test developed during year 4 as well as its repeatability and reproducibility will be tested on serum from pig experimentally infected by *T. spiralis*, according to the OIE and ICT guidelines. The sensitivity and the specificity will be tested on these serum and the cross-reactivity serum from pigs infected by other parasites such as *Ascaris suum*, *Taenia solium*, …
Moreover, the use of the test for detection of other *Trichinella* species infection will also be tested on serum from pigs infected by *T. britovi* and by *T. pseudospiralis*.
An article on the development and use of the aptamers-based test for Trichinella detection will be submitted.
Finally, the PhD student will write his/her PhD thesis manuscript and defend it.

Deliverables

Ref	Title	Due month
D-6	Article on the use of the aptamers-based test submitted	55
D-7	Thesis manuscript is written and thesis defended	57

Milestones

Ref	Title	Due month
M-6	The test is operational (reproducible, repeatable, sensitive and specific)	51
M-7	The test is able to detect the Three Trichinella species in pigs serum	52

2.4.1.1.37 PhD13-R2-FBZ8/AMR2-VIMOGUT-AMR

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ 8: Model Systems (in vitro and in vivo) to study host/food – microbe interactions** **AMR 2: Epidemiological studies into the dynamics of AMR in human and animals populations and the environment including horizontal gene transfer and selection of AMR**		
PhD Project Title	***In VItro* and *in VIvo* analyses and MOdulation of the chicken GUT microbiome to combat AMR.**		
PhD Project Acronym	**VIMOGUT-AMR**		
PhD Supervising Organisation	**P31-WbvR**	Deputy PhD Supervising Organisation	**P21-APHA**
PhD Supervisor	**Michael Brouwer**	Deputy PhD Supervisor	**Muna Anjum**
PhD Start month	**M20**	PhD End month	**M68**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	**WbvR**	FHI
PM									**9,76**	
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						

PM										

Objectives

- Carry out experiments in the *in vitro* model to test ESBL *E. coli* colonisation intervention strategies.
- Carry out experiments in the *in vitro* model to test the transfer range of ESBL plasmids within the microbiome.
- Carry out experiments in the *in vitro* model to test ESBL *E. coli* conjugation intervention strategies.
- Finish all laboratory wet work before the end of this year.

Description of work

Due to COVID-19, sample collection on farm was delayed and is now planned at the end of Y4. Deliverable 2 and Milestones 8 and 9 have been postponed to Y5. As such, Milestones 12 and 13 and deliverable 3 will be postponed to Y6.

The microbiome analysis of caecal samples will be performed, analysed and written into a manuscript, describing more in-depth how the relationship is between the developing chicken gut microbiome and colonisation by ESBL E. coli. Samples that were collected from different broiler farms and flocks during VIMOGUT-AMR in year 4 are analysed.

Laboratory wet work for the project will focus on the use of the *in vitro* chicken gut model in three areas, continuing from the results that are generated during year 4.

Experiments focussing on intervention strategies to prevent ESBL *E. coli* colonisation in the chicken gut model will be tested.

A STM proposal to create fluorescently labelled plasmids has been submitted and, if granted, these will be made at the University of Copenhagen. Experiments to determine the transfer of ESBL plasmids from *E. coli* through the *in vitro* gut microbiome will be carried out using these plasmids.

Finally, based on the strategies from the literature study in year 3, strategies for intervention of plasmid transfer within the microbiome will be tested.

Deliverables

Ref	Title	Due month
D2	Manuscript on relationship between chicken gut microbiome maturation and ESBL colonisation over several farms.	56
D3	Manuscript describing the results of the results of testing *in vitro* ESBL *E. coli* intervention strategies.	68

Milestones

Ref	Title	Due month
M8	Perform 16S sequencing and analysis of caecal samples from OH-EJP VIMOGUT.	50
M9	Write manuscript on relationship between chicken gut microbiome maturation and ESBL colonisation over several farms.	56
M10	Experiments in the *in vitro* model for ESBL *E. coli* colonisation intervention strategies.	60
M11	Experiments in the *in vitro* model to test the transfer range of ESBL plasmids within the microbiome.	60
M12	Experiments in the *in vitro* model to test ESBL plasmid conjugation intervention strategies.	64
M13	Write the manuscript describing the results of the results of testing *in vitro* ESBL *E. coli* intervention strategies.	68

2.4.1.1.38 PhD14-R2-FBZ4-ToxSauQMRA

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ 4: Source attribution and transmission routes**		
PhD Project Title	**Study of the tropism and persistence of Toxoplasma gondii: from pork carcass to sausage and dry ham, a quantitative risk assessment**		
PhD Project Acronym	**ToxSauQMRA**		
PhD Supervising Organisation	**P1-ANSES**	Deputy PhD Supervising Organisation	**P30-RIVM**
PhD Supervisor	**Pascal BOIREAU**	Deputy PhD Supervisor	**Joke VAN DER GIESSEN**
PhD Start month	**M22**	PhD End month	**M60**
Annual period of the OHEJP the PhD work plan applies: M49-M60 (Y5)			

Participant	**1**	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM	**5,27**									
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

"What is the attributable part of the traditional raw pork products in the human Toxoplasma infection? "

Following the scientific question, the present research project aims to respond, based on three main areas of study consisting of (i) a thorough investigation of T.gondii predilection sites in experimentally infested pig carcasses with two different stages (tissue-cyst versus oocyst) (WP1); (ii) evaluate the impact of the manufacturing process (including different incorporation rates of nitrites and NaCl) and the conservation of dry sausage on the viability of T. gondii (WP2); (iii) a quantitative microbiological risk assessment analysis to be conducted for the various raw pork products (dry sausage, dry ham, etc) (WP3).

Description of work

The work is organized into 3 work packages (WPs) with tasks (T). The 3-year project spans over four Annual Periods (Y2-Y5) and is described in four Work Plans.

WP3 - Quantitative microbiological risk assessment

WP start month M37 - WP end month M457

WP participants ANSES, RIVM

WP3-T2 QMRA modelling for human *T. gondii* infections

Task start month M43 - Task end month M57

WP3-T2 takes place over the fourth and the fifth year of the project. During Y5, the main focus is to obtain and report the final results from the base model, scenarios and sensitivity analyses. This will result in pork-products estimates of the most important sources of *T. gondii* infection. Identified knowledge gaps will be ranked as research priorities based on the sensitivity and scenario analyses.

Deliverables

Ref	Title	Due month
D-PhD-ToxSauQMRA-WP3.2	Report on relative contribution of different meat products and tissues to human *T.gondii* infection	M60

Milestones

Ref	Title	Due month
M-PhD-ToxSauQMRA-01	Processing parameters for relevant meat products are provided as input for QMRA	M55
M-PhD-ToxSauQMRA-02	Country-specific estimates for prevalence of human *T. gondii* infection provided as input data for QMRA	M57

2.4.1.1.39 PhD15-R2-FBZ5-TRACE

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ 5: Epidemiological studies: risk factors and dynamics**		
PhD Project Title	**Tracking the public health hazard of foodborne Hepatitis E**		
PhD Project Acronym	**TRACE (TRAcking publiC health risk of hepatitsE)**		
PhD Supervising Organisation	**P30-RIVM**	Deputy PhD Supervising Organisation	**P31-WbvR**
PhD Supervisor	**Eelco Franz**	Deputy PhD Supervisor	**Wim van der Poel**
PhD Start month	**M21**	PhD End month	**M66**

Annual period of the OHEJP the PhD work plan applies:

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	20	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA	PHE
PM										
Participant	23	24	25	26	27	28	29	**30**	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	**RIVM**	**WbvR**	FHI
PM								**1,58**	**3,28**	
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

1. on explaining HEV strain shifts and HEV disease outcomes related to HEV circulation and HEV variability
2. Evaluation of results for future anticipation and intervention as possible.

Description of work

Bioinformatics data generated and analyzed in WP1 and WP 2 will be evaluated in association with the results from WP3. It is envisaged that evaluations will help to explain and predict HEV dynamics and thereby help public and veterinary health to anticipate on the changing epidemiology of HEV.

Deliverables

Ref	Title	Due month
D4	Publication on explaining HEV strain shifts and HEV disease outcomes related to HEV circulation and HEV variability	60
D5	Evaluation of results for future anticipation and intervention as possible.	60

Milestones

Ref	Title	Due month
N/A		

2.4.1.1.40 PhD16-R2-FBZ2/AMR6.1-Codes4strains

Reference to the Stategic Research Agenda (please refer to D2.7)	**FBZ 2: Development and harmonisation of NGS-based methods for detection and tracing of FBZ agents, emerging threats and AMR determinants** **AMR 6.1: Development of NGS-based tools for surveillance of AMR in Enterobacteriaceae in animals, humans and the environment**		
PhD Project Title	**Tracking bacterial pathogens through sources, geography and time using stable phylogenetically-informative genome codes**		
PhD Project Acronym	**Codes4strains**		
PhD Supervising Organisation	**P20-IP**	Deputy PhD Supervising Organisation	**N/A**
PhD Supervisor	**Sylvain Brisse**	Deputy PhD Supervisor	**N/A**
PhD Start month	**M22**	PhD End month	**M57**

Annual period of the OHEJP the PhD work plan applies:

Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	16	17	18	19	**20**	21	22
	SSI	UT	VFL	INIA	UCM	MVNA	INRA	**IP**	APHA	PHE
PM								**2,00**		
Participant	23	24	25	26	27	28	29	30	31	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR	FHI
PM										
Participant	33	34	35	36	37	39	40	41	42	43
	NVI	PIWET	INIAV	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM										
	44	45	46	47						

Participant	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

To disseminate the LINcodes approach towards collaborating partner institutes and to evaluate this approach in one Health and Global Health contexts

To write-up the PhD dissertation and get the diploma

Description of work

In the last three quarters of the PhD we will disseminate the method and work with our partners (James Hutton Institute; Roslin Institute; AP-HP) to define applicability and practicability of the novel approach to address questions of transmission of Kp and Ecoli across sectors and countries.

Deliverables

Ref	Title	Due month
D5.1	Method implemented in partners' labs	6
D5.2	PhD viva	9

Milestones

Ref	Title	Due month
D5.1	LINcodes method disseminated	6
D5.2	Viva presented	9

2.4.1.1.41 ASM Satellite Workshop 2022

Workshop Title	**Diagnostics workshop; mobile detection platforms for One Health diagnostics applications**									
Workshop Organising Institute	**23-UoS**			Deputy Workshop Organising Institute				**25-NUIG**		
Workshop Coordinator	**Marwa M. Hassan**			Deputy Workshop Coordinator				**Owen Higgins**		
Workshop Start Month	**M42**			Workshop End Month				**M56**		
Participant	1	2	4	5	6	7	8	9	10	11
	Anses	Ages	Sciensano	NCIPD	NDRVMI	SZU	VRI	BfR	FLI	RKI
PM										
Participant	12	13	14	15	16	17	18	19	20	21
	DTU	SSI	UT	VFL	INIA	UCM	MVNA	INRA	IP	APHA
PM										
Participant	22	**23**	24	**25**	26	27	28	29	30	31
	PHE	**UoS**	OKI	**NUIG**	TEAGASC	ISS	IZSAM	IZSLER	RIVM	WbvR
PM		**0,45**		**0,00**						
Participant	32	33	34	35	36	37	38	39	40	41
	FHI	NVI	PIWET	INIAV	INSA	IISPV	IC	SLV	FoHM	SVA
PM										

Objectives

• Understanding the significance of comparative genomics in selecting antimicrobial resistance target sequences with relevance from a One Health perspective.

• Understanding factors affecting the design of diagnostic assays for OHEJP applications.

• Learning about LAMP and LEC-LAMP as mobile diagnostics platforms and discussing current challenges with application in both clinical and environmental settings.

• Offering the opportunity to provide a hands-on approach to designing LAMP and LEC-LAMP diagnostic assays targeting antimicrobial resistance markers.

• Discussing molecular diagnostics for pathogen and antimicrobial resistance identification in humans, animals and the environment with focus on the One Health approach.

Description of work

This satellite workshop will focus on the use of rapid and innovative diagnostics for pathogen and antimicrobial resistance detection in clinical and environmental settings. The workshop's objectives are to discuss factors influencing the design of isothermal nucleic acid diagnostic assays for One Health applications, including sample types, target sequences and assay format. A second objective will be to illustrate the background of two key mobile diagnostics platforms: LAMP and LEC-LAMP,

their application in diagnostics, advantages compared to conventional assays and to discuss current challenges. LAMP is a rapid loop-mediated isothermal amplification approach used to detect target nucleic acids; while LEC-LAMP is a recently developed modified LAMP assay that can facilitate single nucleotide polymorphism (SNP) identification and multiplex target detection. The workshop will also provide the opportunity for a hands-on in-silico approach to the design of diagnostic assays using LAMP and LEC-LAMP platforms, with the focus on targeting zoonotic pathogens and antimicrobial resistance genes.

WP 1: Planning and organisation of the ASM Satellite Workshop 2022:
Diagnostics workshop; mobile detection platforms for One Health diagnostics applications
WP start month: 42
WP end month: 56
WP Leader: 23-UoS
Deputy WP: Leader 25-NUIG
WP participants: EJP Communication team, EJP WP6, ASM Satellite Workshop 2022 organisers
Description of the WP 1: This work package is to cover all planning and organising of the ASM Satellite Workshop 2022 including communication and delivery of the workshop as detailed below.

Task 1: Event planning and organisation
Task start month: 42
Task end month: 56
Task Leader: 23-UoS
Deputy Task Leader: 25-NUIG
Task Participants: ASM Satellite Workshop 2022 organisers, EJP communication team
Description of the task: This task is for organising and planning all activities involved in the workshop to ensure successful ASM Satellite Workshop. This will include organising all the workshop logistics, local organising meetings and overseeing the event development plan. The task also involves all administrative work of updating of the budget plan and dissemination of forms. The task also oversees coordinating with Task 3 leaders for preparing and reporting the feedback after the workshop and finalising the budget.
It will be liaised with ASM conference organisers to identify and reserve required room for running the workshop, any required support, catering for the day and provide solutions for any technical difficulties encountered.

Task 2: Event marketing and promotion
Task start month: 42
Task end month: 56
Task Leader: 23-UoS
Deputy Task Leader: 25-NUIG
Task Participants: ASM Satellite Workshop 2022 organisers, EJP communication team
Description of the task: This task is for preparing all advertising materials, marketing and promoting for the event with the EJP communication team and the ASM conference organisers. There will be a promotional campaign to promote for the event through EJP communication channels (Emails, Twitter, LinkedIn, Facebook, EJP websites, groups on EJP Website (Member's area), EJP Education and Training Bulletin, EJP newsletter and ASM promotions).

Task 3: Hands-on Diagnostics workshop planning
Task start month: 42
Task end month: 56
Task Leader: 23-UoS
Deputy Task Leader: 25-NUIG
Task Participants: ASM Satellite Workshop 2022 organisers

This task is for organising the hands-on in-silico workshops and liaising with task 1 for event planning and organisation. The task is divided into two subtasks for managing and planning the two hands-on workshops during the event (LAMP and LEC-LAMP workshops), which includes preparation of the workshop materials, background reading, and future communications.
Sub-Task 1: LAMP diagnostics workshop
Sub-Task start month: 42
Sub-Task end month: 56
Sub-Task Leader: Marwa M. Hassan (23-UoS)
Deputy Sub-Task Leader: Roberto La Ragione (23-UoS)
Sub-Task Participants: 25-NUIG
Description of the sub-task: Participants will learn background information about LAMP, understand all factors involved in the design and development of a LAMP assay, learn how to design a LAMP assay in-silico and apply that in designing a LAMP assay for pathogen and antimicrobial resistance detection in clinical and environmental settings. There will be a lot opportunities to discuss molecular diagnostics, mobile detection platforms and the different sample types for One Health diagnostics applications. Participants will learn the impact of all these factors in defining and designing a diagnostic assay and how to modulate these factors.
Sub-Task 2: LEC-LAMP diagnostics workshop
Sub-Task start month: 42
Sub-Task end month: 56
Sub-Task Leader: Owen Higgins (25-NUIG)
Deputy Sub-Task Leader: Terry Smith (25-NUIG)
Sub-Task Participants: 23-UoS
Description of the sub-task: Participants will expand on information gained in the LAMP diagnostics workshop learning all factors involved in LEC-LAMP application, design and assay development. There will be particular focus on LEC-LAMP probe design for detection of individual SNPs associated with human and animal antimicrobial resistance, as well design of multiplex LEC-LAMP assays for simultaneous multiple target detection and internal amplification control incorporation.

Deliverables		
Ref	Title	Due month
Task 1	LAMP and LEC-LAMP Diagnostics workshop meeting	44
Task 2	ASM Satellite workshop advertising	53
Task 1	ASM Satellite workshop report	56
Milestones		
Ref	Title	Due month
Task 1	Planning event logistics and administrative work	44
Task 3	Planning all the hands-on workshops materials	50
Task 2	Developing advertising materials	52
Task 2	Promotion of the event	53

2.4.1.1.42 Summer School 2022 (No application received to date)

2.4.1.1.43 CPD module 2022 (No application received to date)

2.4.1.1.44 Short Term Missions 2022

Reference to the Stategic Research Agenda (please refer to D2.7)			**Short Term Missions 2022**							
Activity Title			**Short Term Missions 2022**							
Activity Acronym			**STM 2022**							
STM Beneficiaries			**P16-INIA** **P21-APHA** **23-UoS** **P31-WbvR** **P35-INIAV**							
PhD Start month			**M49**		PhD End month			**M60**		
Annual period of the OHEJP the PhD work plan applies: Y5										
Participant	1	2	4	6	7	8	9	10	11	12
	Anses	Ages	Sciensano	NDRVMI	SZU	VRI	BfR	FLI	RKI	DTU
PM										
Participant	13	14	15	**16**	17	18	19	20	**21**	22
	SSI	UT	VFL	**INIA**	UCM	MVNA	INRA	IP	**APHA**	PHE
PM				**0,00**					**0,00**	
Participant	**23**	24	25	26	27	28	29	30	**31**	32
	UoS	OKI	NUIG	TEAGASC	ISS	IZSAM	IZSLER	RIVM	**WbvR**	FHI
PM	**0,00**								**0,00**	
Participant	33	34	**35**	36	37	39	40	41	42	43
	NVI	PIWET	**INIAV**	INSA	IISPV	SLV	FOHM	SVA	NMVRVI	ISCIII
PM			**0,00**							
Participant	44	45	46	47						
	BIOR	RUOKA	THL	NEBIH						
PM										

Objectives

To complete the six short term missions described below to share scientific expertise, knowledge, facilities and methodologies to harmonise approaches in the area of Foodborne Zoonoses (FBZ), Antimicrobial Resistance (AMR), and Emerging Threats (ET). Reports for each of these short term missions will be provided, and summaries and testimonials from each of these missions will be made available on the One Health EJP website.

Description of work

Task STM 2022_1: Application of spatial models to identify new environmental surveillance indicators on salmonella and campylobacter in pig and poultry.
Expected date: 1st semester of 2022
Task Participants: Antonio Rodríguez (INIA), Arno Swart (RIVM)
Place to visit: RIVM (NL)
Research Domain: Foodborne Zoonoses
Description of the task:

Spatial analyses poultry and wild boar infection using ML:

Week 1

• Familiarize with the RIVM environment, computational system (R servers).
• Run the existing model, learn about the packages used (tidyverse, sf, st).
• Make an inventory of new spatial environmental or climatic data that might be appropriate.

Week 2

• Format the new data on poultry and wild boar for reading in R.
• Visualize patterns of infection, and define scope of the research (spatial and temporal).
• Add new data on poultry and wild boar to the ML framework
• Run analyses.

Week 3

• Train the model, apply cross-validation to assess accuracy
• Interpret results, and until satisfactory results are obtained:
- tune models or,
- attempt other ML models (this is possible in the current framework) or,
- add more spatial risk factors when available
• Run the trained model to generate risk-maps

Week 4

• Report results (risk-maps, risk-factors) with emphasis on:
- Accuracy of the results
- Interpretations (biological/epidemiological) of risk-factors found
- Practical implications for surveillance

Task STM 2022_2: Surveillance and source-attributionof AMR based on Metagenomic Analysis
Expected date: A 12-day period in January-February 2022
Task Participants: Ana Cristina Ferreira (INIAV), Tine Hald (DTU)
Place to visit: National Food Institute, Technical University of Denmark (DTU), Denmark
Research Domain: AMR
Description of the task:

Most surveillance and epidemiology of AMR are based on phenotypic laboratory results for specific pathogens. This procedure leads to a narrow pathogen spectrum not capturing all relevant AMR genes, so approaches based on identifying all AMR determinants present in an environment, obtained by

metagenomic sequencing, can better appraise the risks for human exposure. The focus of this Short-Term Mission (STM) will be to apply novel approaches and models based on metagenomic data for surveillance and to infer source attribution of AMR determinants.

The 12-days short-term scientific mission will be planned as follows:

Day 1: Introduction to the team at DTU: Explain the procedures for metagenomics analyses at DTU.

Get an overview of the metagenomics data available from DISCOVER and INIAV. Go through a relevant dataset prepared by DTU with the purpose of training.

Day 2: From sampling to sequencing:

Visit in the lab to learn about the processing of samples for metagenomics analysis.

Day 3-5: From reads and results:

Getting access to Computerome (DTU super computer for analysing big data). Learning about the pipelines used for metagenomics data (MGMapper and Kraken)

Apply the ResFinder tool to identify AMR determinants.

Learning about approaches for quantifying AMR determinants in a sample.

Analyse and interpret sequence reads.

Day 6-7– sightseeing in Copenhagen

Day 8-9 Use of results for surveillance: Analyse metagenomics data together with epidemiological data for surveillance to explain trends

Day 10-11 Use of results for source attribution:

Analyse metagenomics data from human and different animal and environmental sources using machine-learning approaches to identify possible transmission between reservoirs.

Day 12: Wrap up: Reflect and discuss the methodologies learned.

Make a plan for further analyses and collaboration.

Task STM 2022_T3: Tolerance of biofilm forming bacteria to disinfectants after repeated disinfectant exposure

Expected date: A 12-day period in January-February 2022

Task Participants: Emma Brook (APHA), Ane Mohr Osland and Lene Karine Vestby (NVI)

Place to visit: Norwegian Veterinary Institute (NVI), Norway

Research Domain: Foodborne Zoonoses

Description of the task:

The use of disinfectants as a method of controlling food-borne pathogens in UK pig and poultry farms is very common. Whilst vast amounts efficiency testing has been performed on commercial disinfectants against planktonic *Salmonella*, research against biofilm cultures is still relatively novel. Opposed to planktonic bacteria, bacteria in biofilm can tolerate significantly higher doses of disinfectants. Bacteria form biofilms by encasing themselves in an extracellular matrix. Acting as a shelter, the matrix provides a physical barrier (i.e. reduced perfusion). Biofilms also initiate genetic diversification. It is this diversification which is causing apprehension for the potential for pathogens to develop resistance/tolerance to disinfection treatment. Should this be the case, there is a concern for the effectiveness of biosecurity measures currently used to protect against food-borne disease. NVI has expertise in standardised biofilm test methods, including testing of antimicrobials against *Staphylococcus aureus* and biofilm forming capabilities of *Salmonella*. The purpose of the visit is to build on already existing relationships between APHA and NVI, and further share knowledge in the areas of disinfectants and biofilms.

The short-term scientific mission will be planned as follows:

During the first week, NVI will provide training for the applicant on various well-established and published methods used in biofilm research, applying minor modifications to suit the project aim. The main method looked at will be the coupon method, used for assessment of disinfectant efficacy

against biofilms. Once trained, the applicant will then spend the following weeks working with NVI to develop the method further to assess the tolerance of *Salmonella* biofilms after repeated exposure to disinfection treatment. Surviving bacteria found on the coupons after disinfection, will be collected for analyses in further studies. The duration of the visit should allow time to gather enough results to culminate in a manuscript.

The coupon method is a disinfectant bactericidal test for biofilms grown on glass slides (Vestby & Nesse, 2015), as well as various other environmental surfaces such as stainless steel and PVC. The testing will be carried out using the same panel of NVI isolates, as previously used in collaborative research by NVI and APHA, on the standardisation of methods used to test disinfectants against biofilms. The test will be developed to work in conjunction with current and planned future biosecurity projects of both host and home institutes; involving work on disinfectants, biofilms and AMR isolates.

The applicant will apply the new skills learnt to their continued work at APHA. Applying knowledge gained to future research projects, involving the testing of commercial disinfectants against broader panels of *Salmonella* and other such food-borne pathogens, from pig and poultry environments.

Task STM 2022_T4: Validation and exchange of modelling tools to assess the risk of human salmonellosis based on environmental factors using multiple sources of data.

Expected date: 1 month during the first half of the year 2022

Task Participants: Laura C. Gonzalez Villeta (University of Surrey), Eelco Franz, Lapo Mughini Gras

Place to visit: RIVM (the Netherlands)

Research Domain: Foodborne Zoonoses

Description of the task:

The purpose of the visit is to establish a close collaboration with the ADONIS OHEJP project to share our knowledge and methods, which can be of mutual benefit for our research outcomes.

ADONIS and EnvDis are two OHEJP projects with a similar research scope, yet with different approaches, where human salmonellosis is studied with the aim of better understanding the epidemiology of the disease:

ADONIS focuses on explaining the trends in the time-series of salmonellosis incidence. Their approach is based on the variations of explanatory factors, such as national surveillance systems in humans and poultry, following a longitudinal approach. EnvDis aims to estimate the incidence of salmonellosis conditional to certain environmental exposures. It assumes that this conditional incidence is, in general, not depending on time. In addition, it aims to incorporate mechanistic processes, such as bacterial growth in the food source of human transmission. A key benefit of working closely together is to bring the temporal dimension, typical of timeseries analysis, into the conditional incidence approach. Vice-versa, by applying the conditional incidence approach to different settings we would be able to assess whether the relationship between salmonellosis and exposure is universal. This collaboration will enhance the robustness of our findings and it will help in overcoming the intrinsic limitations of the different approaches.

A detailed plan of activities will depend on the progress made from both sides (EnvDis and ADONIS projects) until the STM takes place. However, proposed activities include:

Week 1 – Data readily available :

- Access to RIVM data,
- Get familiar with the data
- Processing the data to ensure the format is compatible with the computer codes developed for the data in England and Wales.

Although we will try to prepare in advance for the kind of data we will work with, we need to take into account any possible delay (e.g. setting up IT account and familiarizing with the data extraction software in place).

By the end of week one we will have our codes ready to be applied to the data from RIVM.

Week 2 – Apply RIVM methodology to England and Wales data

- In-depth, technical understanding of the data and methodology developed by our collaborators at RIVM's.
- Adaptation of the RIVM methodology and apply it to the England and Wales data.
- Make any necessary adjustments to the model.

Week 3 – Apply EnvDis methodology to Dutch data

- Continuing the work developed in Week2.
- Apply the methodology based on conditional incidence to RIVM data.
- Make any necessary adjustments to the model.

Week 4 – Closing remarks

- Discuss findings.
- Draft the outlines for a joint publication.
- Ensure that both institutions have mutual and durable access to computer codes underlying the methods.

Task STM 2022_T5: Construction of double-labelled E. coli strains to study the effect of antibiotics and interventions on horizontal ESBL genes transfer in the chicken's caecal microbiome.
Expected date: 6 weeks
Task Participants: Ingrid Cardenas Rey (WBvR, the Netherlands)
Place to visit: DTU (Danemark)
Research Domain: AMR
Description of the task:

Task name	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6	WEEK 7	WEEK 8	WEEK 9	Associated cost
Introduction week										Plane ticket, train, lodging, food, other transport.
Donor strain construction										Lodging, food, and transport.
Construction of GFP plasmid										Lodging, food, and transport.
Mating experiments										Lodging, food, and transport.
Double labelled strain - growth test										Lodging, food, and transport.
FACS analysis										Lodging, food, and transport.

Introduction week

The first week of the project is used for a detailed introduction to the work necessary to accomplish the STM. In addition, the experimental work of the different steps of the process will be discussed in-depth, and an introduction to local laboratory health and safety regulations will be addressed.

Donor strain construction

Several broiler *E. coli* isolates from the collection of WBVR will be sent to Copenhagen before the start of the project. The process of chromosomal fluorescent tagging using lambda recombineering will be performed. It will aim to produce at least one fluorescent donor for downstream experiments in the OH-EJP VIMOGUT project. The inclusion of a *lacI* gene in the donor strain will allow for silencing the plasmid-encoded fluorescence protein.

GFP plasmid construction

In addition to the chromosomal fluorescent tag, a fluorescent tag for which expression is controlled by a lac-repressible promotor is introduced on ESBL plasmids derived from the collection of plasmids isolated from broilers at WBVR. Plasmids containing diverse replicons will be selected for which WGS data is currently available. Predominant replicons in Dutch broilers will be chosen, including IncI1, IncI2, IncK and IncF.

Mating experiments

Conjugation mating experiments will be performed to test the expression of both the chromosomally encoded and the plasmid-encoded fluorescent proteins and the repression of the plasmid-encoded fluorescent proteins in the native donor.

Growth analysis of double labelled strain

The analysis will be performed to determine any effects of the introduced mutations on the growth of the genetically modified organisms to the wild-type strains.

FACS analysis

Downstream analysis of the transfer of plasmids within the *in vitro* microbiome will occur after the STM has been completed. FACS will be used to discriminate between different populations based on their fluorescent signal; donor strains, transconjugants of various species and naive cells that did not receive a plasmid. Instruction on how to perform the analysis will be given during the STM.

2.4.1.1 List of programmed activities

Activity	Lead Beneficiary N°	Acronym lead beneficiary	PM	Start Month	End Month
WP1	1	Anses	102	49	60
WP2	30	RIVM	5.25	49	60
WP3	4	Sciensano	20	49	60
WP4	41	SVA	16.81	49	60
WP5	9	BfR	25,2	49	60
WP6	23	UoS	11.7	49	60
WP7	27	ISS	16	49	60
JRP12-R2-AMRSH5-FARMED	21	APHA	53.34	49	60
JRP13-R2-AMRSH5-WORLDCO	25	NUIG	44.35	49	60
JRP14-R2-AMR2.1-FULL-FORCE	04	Sciensano	64.38	49	60
JRP15-R2-AMR2.1-FED-AMR	02	Ages	50.26	49	60
JRP16-R2-ET2.2-TELE-Vir	13	SSI	74.36	49	60
JRP17-R2-ET2.2-IDEMBRU	01	Anses	66.21	49	60
JRP18-R2-ET1.1-MEmE	27	ISS	79.15	49	60
JRP19-R2-ET1.1-PARADISE	27	ISS	42.47	49	60
JRP20-R2-FBZSH3-DISCoVeR	12	DTU	58.27	49	60
JRP21-R2-FBZ3.1-BIOPIGEE	09	BfR	78.49	49	60
JRP22-R2-FBZ4.1-TOXOSOURCES	13	SSI	68.78	49	60
JRP23-R2-FBZSH5-ADONIS	30	RIVM	73.31	49	60
JRP24-R2-FBZSH9-BeONE	13	SSI	36.21	49	60
JIP03-R2-IA2.3-CARE	12	DTU	116.17	49	60
JIP04-R2-IA2.2-OH-HARMONY CAP	13	SSI	94.31	49	60

Activity	Lead Beneficiary N°	Acronym lead beneficiary	PM	Start Month	End Month
JIP05-R2-IA2.1-MATRIX	13	SSI	153.8	49	60
JIP06-COVRIN	31	WbvR	111.33	49	63
PhD01-R1-AMR2-ECO-HEN	17	UCM	1	49	49
PhD03-R2-AMR2.1-HME-AMR	26	TEAGASC	9	49	60
PhD04-R2-AMR2.1-KENTUCKY	04	Sciensano	8	49	58
PhD05-R2-AMR2/6.1/ET5-METAPRO	17	UCM	16	49	60
PhD06-R1-ET5-PEMbo	01	Anses	9	49	58
PhD07-R2-ET2.1-MACE	23	UoS	13	49	60
PhD08-R2-ET5.1/4.1/FBZSH3-DESIRE	30	RIVM	0	49	60
PhD09-R2-FBZSH3/AMR2.1-UDOFRIC	21	APHA	12	49	60
PhD10-R2-FBZSH3/AMR2.1-WILBR	21	APHA	14.9	49	58
PhD11-R1-FBZ4/5- EnvDis	23	UoS	12	49	60
PhD12-R2-FBZSH9-AptaTrich	01	Anses	12	49	58
PhD13-R2-FBZ8/AMR2-VIMOGUT-AM	31	WbvR	9.76	49	60
PhD14-R2-FBZ4-ToxSauQMRA	01	Anses	5.27	49	58
PhD15-R2-FBZ5-TRACE	30	RIVM	4,86	49	60
PhD16-R2-FBZ2/AMR6.1-Codes4strains	20	IP	2	49	58
ASM Satellite Workshop 2022	23 25	UoS NUIG	0,45 0,00	49	57
Short Term Missions 2022	INIA-APHA-UoS-WbvR-INIAV		0,00	49	60

2.4.1.2 Annual Deliverables List

Deliverable N°	Deliverable name	WP N°	Acronym of lead beneficiary	Est. Del. Date
D1.16	Annual report on the internal and external newsletter produced during the fourth year	WP1	UoS	M49
D1.17	Complete version of annual report for stakeholders n°4	WP1	UoS	M53
D1.18	Summary progress report year 5	WP1	ANSES	M57
D1.19	Annual report on the internal and external newsletter produced during the fifth year	WP1	ANSES	M60
D1.20	Complete version of annual and final reports for stakeholders n°5	WP1	UoS	M60
D1.21	Submit report on sustainability of website	WP1	UoS	M60
D1.22	Submit a special issue on One Health to a relevant journal	WP1	ANSES	M60
D1.26	Ethical review report for Y4	WP1	ANSES	M50
D1.27	Ethical review report for Y5	WP1	ANSES	M60
D3.18	4th periodic report on JRP	WP3	SCIENSANO	M51
D3.19	Abstract book for 4th Annual Scientific Meeting (ASM)	WP3	SCIENSANO	M54
D3.20	Reporton evaluation of finalised JRPs, 2nd call	WP3	SCIENSANO	M60
D3.21	5th periodic report on JRPs	WP3	SCIENSANO	M60

Deliverable N°	Deliverable name	WP N°	Acronym of lead beneficiary	Est. Del. Date
D4.26	Report from thematic meeting IV	WP4	SVA	M54
D4.27	4th periodic report on JIPs	WP4	SVA	M51
D4.28	Report on evaluation of finalised JIPs, 2nd round	WP4	SVA	M60
D4.29	5th periodic report on JIPs	WP4	SVA	M60
D5.10	Final annual report on dissemination activities to international stakeholders	WP5	BFR	M60
D5.11	Report on a stakeholder meeting	WP5	BFR	M60
D6.14	Report n°3 of the annual short term missions completed also uploaded onto the EJP webpage.	WP6	UoS	M50
D6.15	Report on outputs of the short term missions	WP6	UoS	M60
D6.16	Report n°4 on one workshop per year associated with ASM (with WP1,3,4 and 5)	WP6	UoS	M60
D6.17	Report n°4 of the One health summer school with a minimum of 12 delegates	WP6	UoS	M60
D6.18	Thesis Reports of up to 16 PhD studentships	WP6	UoS	M60
D6.19	Report of the fourth CPD module in one health	WP6	UoS	M60
D6.20	Report n°4 of the annual short term missions completed also uploaded onto the EJP webpage.	WP6	UoS	M60
D6.22	4th Periodic Report on PhDs	WP6	UoS	M51
D7.4	Document on institutionalisation of One Health	WP7	SVA	M50

Deliverable N°	Deliverable name	WP N°	Acronym of lead beneficiary	Est. Del. Date
D7.5	Final One Health SRIA 2021 - 2030	WP7	ISS	M60

2.5 Participation in Annual Work Plan activities

Beneficiaries concerned : P04-SCIENSANO, P06-NDRVMI, P07-SZU, P08-VRI, P09-BfR, P10-FLI, P11-RKI, P12-DTU, P14-UTARTU, P15-VFL, P16-INIA, P17-UCM, P18-MVNA, P19-INRAE P20-IP, P22-PHE, P23-UoS, P24-OKI, P25-NUIG, P23-ISS, P27-IZSAM, P28-IZSLER, P30-RIVM, P32-FHI, P33-NVI, P34-PIWET, P35-INIAV, P36-INSA, P37-IISPV, P39-SLV, P40-FoHM, 42-NMVRVI, 43-ISCIII44,-BIOR, 45-RUOKA, 46-THL, 47-NEBIH	
Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work is performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contribution provided by third parties (articles 11 and 12 of MGA)	**N**
Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.1 P01-Anses

Does the participant plan to subcontract certain tasks (please note that core tasks of the project should not be sub-contracted)	**N**
Does the participant envisage that part of its work is performed by linked third parties	**N**
Does the participant envisage the use of contributions in kind provided by third parties (Articles 11 and 12 of the General Model Grant Agreement)	**Y**
<u>WP6 / Task 6.4 Doctoral Training Programme</u> Anses will use in-kind contribution for the following activities under Article 11: • **Activity PhD06-R1-ET5-PEMbo:** Anses will use the services provided by a PhD student to carry out PhD-E5-PEMbo activities in Anses premises. This PhD student will be employed and paid by the Université Paris-Est Créteil (UPEC).This person will therefore be a seconded employee paid by UPEC and working for Anses. His salary will be supported by the OHEJP under Article 11: in-kind contribution provided by third parties against payment. The work will be carried out on beneficiary's premises. • **Activity PhD12-R2-FBZSH9-AptaTrich:** Anses will use the services provided by a PhD student to carry out PhD12 AptaTrich activities in Anses premises. This PhD student will be employed and paid by the Université Paris-Est Créteil (UPEC). This person will therefore be a seconded employee paid by UPEC and working for Anses. His salary will be supported by the OHEJP under Article 11: in-kind contribution provided by third parties against payment. The work will be carried out on beneficiary's premises. • **PhD14-R2-FBZ4-ToxSauQMRA:** Anses will use the services provided by a PhD student to carry out PhD14 ToxSauQMRA activities in Anses premises. This PhD student will be employed and paid by the Ecole Nationale Veterinaire d'Alfort – ENVA. This person will therefore be a seconded employee paid by ENVA and working for Anses. His salary will be supported by the OHEJP under Article 11: in-kind contribution provided by third parties against payment. The work will be carried out on beneficiary's premises.	
Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.2 P02-AGES

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**Y**
WP3 Joint research projects AGES will use of the in-kind contribution, provided by the following third party under Article 12 of the GA: • **Activity JRP21-R2-FBZ3.1-BIOPIGEE**: University of Veterinary Medicine Vienna (Vetmeduni Vienna - VMU) will provide personnel having specific skills to implement the following tasks: - WP2 (1 PM): VMU will contribute to the development and application of the biosecurity protocol, where input from recent work completed will be given and data from the recent study will be used. - WP4 (1 PM): VMU will provide the information to be collected within WP2 for the economic assessment, to be conducted in Y2 and Y3. - WP5 (1 PM): VMU will contribute to the data integration from WP2 and 4 into the catalogue of biosecurity measures. This builds on previous work which has been done at Vetmeduni Vienna. In-kind contributions not used on beneficiary's premises	
Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.3 P13-SSI

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**Y**
WP4 Joint integrative projects SSI will use of the in-kind contribution, provided by the following third party under Articles 11 of the GA: **Activity JIP05-R2-IA2.1-MATRIX:** University of Copenhagen will provide personnel having specific knowledge on output-based surveillance evaluation as also outline in the MATRIX work plan. University of Copenhagen (UCPH) will play an important role in the development of guidelines for the design, implementation, and evaluation of official controls within the food sector using output-based standards (WP3). UCPH and SSI collaborate closely on a regularly basis as both institutions jointly are responsible for the Danish Veterinary Preparedness. Profs Liza Rosenbaum Nielsen and Hans Houe will be in charge of overseeing the work carried out by UCPH. Both Prof. Nielsen and Prof. Houe have extensive experience with output-based surveillance systems. In-kind contributions not used on beneficiary's premises	
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**

Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**N**
Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.4 P21-APHA

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**Y**

WP6 / Task 6.4 Doctoral Training Programme:
APHA is not an academic institution and as such is not in position to hire PhD student.
Consequently, APFA will use Article 11 of the GA to support the following PhDs:

- **Activity PhD09-R2-FBZSH3/AMR2.1-UDOFRIC:** APHA will use the services provided by a PhD student to carry out PhD09- UDOFRIC activities in APHA premises. This PhD student will be employed and paid by the University of Warwick. This person will therefore be a seconded employee paid by University of Warwick and working for APHA. His salary will be supported by the OHEJP under Article 11: in-kind contribution provided by third parties against payment.

The work will be carried out on beneficiary's premises.

- **Activity PhD10-R2-FBZSH3/AMR2.1-WILBR:** APHA will use the services provided by a PhD student to carry out PhD10-WILBR activities in APHA premises. This PhD student will be employed and paid by the University of Exeter.This person will therefore be a seconded employee paid by University of Exeter and working for APHA. His salary will be supported by the OHEJP under Article 11: in-kind contribution provided by third parties against payment.

The work will be carried out on beneficiary's premises.

Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.5 P31-WbVR

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**Y**

WP6 / Task 6.4 Doctoral Training Programme:
WbVR will use in-kind contribution for the following activity under Article 11:

- **Activity PhD13-R2-FBZ8/AMR2-VIMOGUT-AMR:** WbVR will use the services provided by a PhD student to carry out PhD13 WIMOGUT-AMR activities in WbVR premises. This PhD student will be employed and paid by the Wageningen University & Research (WUR). This person will therefore be a seconded employee paid by WUR and working for WbVR . His salary will be supported by the OHEJP under Article 11 of the GA: in-kind contribution provided by third parties against payment.

The work will be carried out on beneficiary's premises

WP3 /Joint research projects WbvR envisages the use of the following in-kind contributions, provided by the following third parties under Articles 11 of the GA. • **Activity JRP14-R2-AMR2.1-FULL-FORCE**: University Utrecht (UU) will contribute to the project with the provision of human resources. The scientists involved in the project are specialised in infectious diseases and animal health. In-kind contributions not used on beneficiary's premises • **Activity JRP20-R2-FBZSH3-DISCoVeR**: University Utrecht (UU) will provide personnel having specific expertise, with a focus on analysis of bacterial (meta-) genomes for comparative genomics, molecular epidemiology and linking bacterial genotype to phenotype. In-kind contributions not used on beneficiary's premises • **Activity JRP21-R2-FBZ3.1-BIOPIGEE:** University Utrecht (UU) will provide personnel having specific expertise in and capabilities for designing pig farm audits and performing pig farm visits for auditing of biosecurity and pig health as well as potential hazards for animal and public health. In addition UU has considerable expertise in handling the data of these audits for further analyses. The work will be carried out on beneficiary's premises.

Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.5.6 P41-SVA

Does the participant plan to subcontract certain tasks (please note that core tasks of the programme should not be subcontracted) (article 13 of MGA)	**N**
Does the participant envisage that part of its work will be performed by linked third parties (article 14 of MGA)	**N**
Does the participant envisage the use of in-kind contributions provided by third parties (articles 11 and 12 of MGA)	**Y**
WP7/ T7.4: Making the bridges between EJP's beneficiaries and stakeholders sustainable SVA will use Article 11 of the GA to carry out the T7.4: Making the bridges between EJP's beneficiaries and stakeholders sustainable. The task of drafting of a detailed plan for an EU-wide analysis of current work processes, shared infrastructures, reference documents and guidelines across the multifacted OH interface (environmental health-animal health-public health) will be conducted partly in the form of a PhD project in collaboration with Roskilde University (DK), Department of Social Sciences and Business. The contribution from Roskilde University will be to cover a part of PhD salary and tuition fees. The work will be carried out on Roskilde University's premises. In-kind contributions not used on beneficiary's premises.	
Does the participant envisage the provision of financial support to third parties (article 15 of MGA)	**N**

2.6 Resources to be committed

2.6.1 Summary Effort Table

2.6.1.1 Overarching activities

Organisation	WP1-Coordination	WP2-SRA	WP3-JRPs management	WP4-JIPs management	WP5-Science to Policy translation	WP6-T&E management	WP7-Sustainability	Total
P01-Anses	47.00							47.00
P02-Ages	0.50							0.50
P04-Sciensano	5.00		17.00	1.50				23.50
P06-NDRVMI	0.50							0.50
P07-SZU	0.50							0.50
P08-VRI	0.50							0.50
P09-BfR	0.50				13.33			14.50
P10-FLI	0.50							0.50
P11-RKI	0.50							0.50
P12-DTU	0.50							0.50
P13-SSI	0.50		3.00		11.20			14.70
P14-UT	0.50							0.50
P15-VFL	0.50							0.50
P16-INIA	0.50							0.50
P17-UCM	0.50	3.00						3.50
P18-MVNA	0.00							0.00
P19-INRA	0.50							0.50
P20-IP	0.50							0.50
P21-APHA	0.50							0.50
P22-PHE	0.50							0.50

Organisation	WP1-Coordination	WP2-SRA	WP3-JRPs management	WP4-JIPs management	WP5-Science to Policy translation	WP6-T&E management	WP7-Sustainability	Total
P23-UoS	30.00					9.90		39.90
P24-OKI	0.50							0.50
P25-NUIG	0.50							0.50
P26-TEAGASC	0.50							0.50
P27-ISS	0.50						2.00	2.50
P28-IZS AM	0.50							0.50
P29-IZS LER	0.50							0.50
P30-RIVM	0.50	2.25						2.75
P31-WbvR	0.50					1.80		2.30
P32-FHI	0.50							0.50
P33-NVI	0.50			1.31				1.81
P34-PIWET	0.50							0.50
P35-INIAV	0.50							0.50
P36-INSA	0.50			2.00				2.50
P37-IISPV	0.50							0.50
P39-SLV	0.50							0.50
P40-FoHM	0.50							0.50
P41-SVA	0.50			12.00			14.00	26.50
42-NMVRVI	0.50							0.50
43-ISCIII	0.50							0.50
44-BIOR,	0.50							0.50
45-RUOKA	0.50							0.50
46-THL	0.50							0.50
47-NEBIH	0.50							0.50
TOTAL	**102.00**	**5.25**	**20.00**	**16.81**	**25.20**	**11.70**	**16.00**	**196.96**

Training and Education activities

Organisation	CPD-2022	PhD01-AMR2-ECO-HEN	PhD02-AMR2/3/6-PhD LIN-RES	PhD03-AMR2.1-HME-AMR	PhD04-AMR2.1-KENTUCKY	PhD05-AMR2/6.1/ET5-METAPRO	PhD06-ET5-PEMbo	PhD07-ET2.1-MACE	PhD08-ET5.1/4.1/FBZSH3-DESIRE	PhD09-FBZSH3/AMR2.1-UDOFRIC	PhD10-FBZSH3/AMR2.1-WILBR	PhD11-FBZ4/5-EnvDis	PhD12-FBZSH9-AptaTrich	PhD13-FBZ8/AMR2-VIMOGUT-AMR	PhD14-FBZ4-ToxSauQMRA	PhD15-FBZ5-TRACE	PhD16-FBZ2/AMR6.1-Codes4strains	SS-2022	STM-2022	WS-2022	TOTAL
P01-Anses							9,00						12,00		5,27						26,27
P04-Sciensano				8,00																	8,00
P16-INIA																			0,00		0,00
P17-UCM		1,00			16,00	14,00															17,00
P20-IP																	2,00				2,00
P21-APHA										12,00	14,90								0,00		26,90
P23-UoS								13,00				12,00						0,00	0,00	0,45	25,45
P26-TEAGASC			9,00																		9,00
P30-RIVM									0,00							1,58					1,58
P31-WbvR														9,76		3,28			0,00		13,04
P35-INIAV																			0,00		0,00
TOTAL		**1,00**	**9,00**	**8,00**	**16,00**	**14,00**	**9,00**	**13,00**	**0,00**	**12,00**	**14,90**	**12,00**	**12,00**	**9,76**	**5,27**	**4,86**	**2,00**	**0,00**	**0,00**	**0,45**	**129,24**

2.6.1.3 Joint Research Projects/ Joint Integrative Projects

Organisation	JIP03-IA2.3-CARE	JIP04-IA2.2-OH-HARMONY CAP	JIP05-IA2.1-MATRIX	JIP06-Covrin	JRP12-AMRSH5-FARMED	JRP13-AMRSH5-WORLDCOM	JRP14-AMR2.1-FULL-FORCE	JRP15-AMR2.1-FED-AMR	JRP16-ET2.2-TELE-Vir	JRP17-ET2.2-IDEMBRU	JRP18-ET1.1-MEmE	JRP19-ET1.1-PARADISE	JRP20-FBZSH3-DISCoVeR	JRP21-FBZ3.1-BIOPIGEE	JRP22-FBZ4.1-TOXOSOURCES	JRP23-FBZSH5-ADONIS	JRP24-FBZSH9-BeONE	TOTAL
P01-Anses	11,50	2,90	4,55	28,55			4,00		12,00	15,00	14,50	3,26	3,00	2,00	9,70	4,20		**115,16**
P02-Ages								6,49						7,00		1,30		**14,79**
P04-Sciensano				0,35	9,35		6,12		1,00							7,96		**24,78**
P06-NDRVMI										5,50				10,00				**15,50**
P07-SZU								1,27							3,15			**4,42**
P08-VRI				1,00					0,00			2,20	8,00	9,00	5,00			**25,20**
P09-BfR		2,00	10,30	1,90	3,50		1,75	0,50		5,80		1,50	0,20	12,00	3,70		6,00	**49,15**
P10-FLI			4,20	8,64		7,60		7,98		11,65	4,50				4,50		0,30	**49,37**
P11-RKI												3,50		12,00	0,40		0,60	**16,50**
P12-DTU	5,50		0,00		5,00		3,85						2,60		0,60		1,50	**19,05**
P13-SSI	10,00	22,00	14,50		4,50		14,29	2,00	2,10		14,50	7,00	3,70		6,65	9,00	9,00	**119,24**
P14-UT						8,00		6,00			2,30							**16,30**
P15-VFL											0,70			3,70				**4,40**
P16-INIA			14,00	3,00			0,00		1,80									**18,80**
P17-UCM	6,00		6,50	0,75	12,00	10,00							4,00		5,40	6,00		**50,65**
P18-MVNA																		**0,00**
P19-INRA	15,90					2,15												**18,05**
P20-IP	4,60							0,50								4,20		**9,30**
P21-APHA	5,37	8,69	4,65	11,19	6,13		3,05			1,91			2,06	7,85		6,08	1,90	**58,88**
P22-PHE													0,75			0,75	0,50	**2,00**
P23-UoS			4,20	7,59		6,40		6,48	5,10			2,70			2,00			**34,47**
P24-NNK											1,30							**1,30**
P25-NUIG						4,35		0,00										**4,35**
P26-TEAGASC		2,40											1,08					**3,48**
P27-ISS	6,50	16,50	4,50	2,76	2,75		3,75				27,60	9,00	8,30	0,50	9,50	2,20		**93,86**
P28-IZS AM	3,00		13,50	4,24	6,50				3,50	5,40				0,00			2,00	**38,14**
P29-IZS LER	16,00			8,00					16,50					0,30				**40,80**
P30-RIVM	2,50	2,28	4,00	8,27			3,69				1,33	1,68	4,80	0,62	4,32	10,02	4,00	**47,51**
P31-WbvR	1,10		2,60	3,50	3,61		7,06			3,15			2,51	7,52	0,60	2,82		**34,47**
P32-FHI		1,42	11,18										1,62		1,09		0,90	**16,21**
P33-NVI		1,32	4,99	5,22			0,92	1,65	1,50		1,80	0,82	0,59	1,00	1,17		0,75	**21,73**
P34-PIWET	12,00	5,00	12,50	7,44			3,10	7,50	5,00		3,01	0,20	3,00	1,00	3,40	4,50	3,25	**70,90**
P35-INIAV		3,50		2,00						6,60	2,01	0,96	2,75		5,80	4,95		**28,57**
P36-INSA		10,50	11,50	1,17		8,00	5,85	9,89	19,86	11,20	3,50		6,06		0,80	9,33	5,51	**103,17**
P37-IISPV																		**0,00**
P39-SLV	0,90	0,40										1,15			1,00			**3,45**
P40-FoHM	3,50	3,00	3,00				0,90					1,00						**11,40**
P41-SVA	2,10	6,40	13,00	3,06			3,90		6,00		3,40	6,20	3,25	4,00	0,00			**51,31**
P42-NMVRVI																		**0,00**
P43-ISCIII	0,70																	**0,70**
P44-BIOR	6,00	6,00		2,70														**14,70**
P45-RUOKA	3,00		10,13															**13,13**
P46-THL																		**0,00**
P47-NEBIH																		**0,00**
TOTAL	**116,17**	**94,31**	**153,80**	**111,33**	**53,34**	**44,35**	**64,38**	**50,26**	**74,36**	**66,21**	**79,15**	**42,47**	**58,27**	**78,49**	**68,78**	**73,31**	**36,21**	**1265,19**

2.6.2 Other major cost items (equipment, goods and services, travel & subsistence, meetings organisation)

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
P01-Anses	**3 800,00**		**119 697,00**		**55 808,00**		**15 000,00**	
WP1	**0,00**		**0,00**		**5 000,00**		**15 000,00**	
WP1-Coordination	0,00		0,00		5 000,00	Governing meetings	15 000,00	1 PMC/POC meeting and 2 SSB meetings
WP3	**3 800,00**		**69 198,00**		**27 918,00**		**0,00**	
ASM T&S-2022	0,00		0,00		9 000,00	1 FOC delegate, 3 VIP - PMT, 8 VIP - ESAB, 3 VIP - PhD	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		12 800,00	Publication costs, Lab reagents for SMRT sequencing, Lab reagents for MGE investigation	560,00	Annual meeting at ECCMID 2022	0,00	
JRP16-ET2.2-TELE-Vir	0,00		7 000,00	Utensils, Other reagents and enzymes	3 218,00		0,00	
JRP17-ET2.2-IDEMBRU	3 800,00	Data server--> cost 25 000 €, 5 years of depreciation, 80 % of use for EJP (project of 2.5 years) --> eligible costs = (25000*6/60)*0,80=2000	9 000,00	Consumables for in vivo infection models, Consumables for phenotypic analyses, Consumables for toolkit, Consumables for coordination	2 800,00	Annual workshop (Final meeting, 2022, Italy, 2 participants, 2 days, 2 nights)	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
		, Microscop 20 000 €, 5 years of depreciation , 90 % of use for EJP (project of 2.5 years) --> eligible costs = (20000*6/60)*0,9=9000						
JRP18-ET1.1-MEmE	0,00		20 298,00	Reagents for molecular studies, International courrier for the shipment of samples, Publication fees	1 400,00	Final meeting Y5 (Rome)	0,00	
JRP19-ET1.1-PARADISE	0,00		13 600,00	Molecular biology reagents and Kits for NGS, Aptamers processing, Aptamers validation, Reagents for hybridization probes, Shipment of samples to partners	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		1 200,00	Meetings	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		2 100,00	Mid-term meeting, Final meeting, WP3-meeting,	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
						WP4-meeting, WP6-meeting		
JRP22-FBZ4.1-TOXOSOURCES	0,00		1 500,00	Publication and dissemination costs	2 800,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP23-FBZSH5-ADONIS	0,00		5 000,00	Molecular biology (MLVA, WGS)	3 440,00	ADONIS last meeting, other Meetings	0,00	
WP4	**0,00**		**29 192,00**		**22 890,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		1 000,00	other GOODS AND SERVICES/WP1, WP2, WP, WP4	6 300,00	Closing meeting, SSI, Copenhagen, 1,5 days, Joint-EJP Workshop meeting, SSI, Copenhagen, 1 day	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		2 692,00	Taq Polymerase, DNA extraction reagents, Plastic consumables, Fish	11 190,00	Final meeting & workshop, Training	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		2 100,00	Consortium meetings	0,00	
JIP06-COVID19-COVRIN	0,00		25 500,00	Publication, Transport and Consumables costs	3 300,00	Consortium meetings	0,00	
WP6	**0,00**		**21 307,00**		**0,00**		**0,00**	
PhD06-ET5-PEMbo	0,00		3 000,00	APC - Article Publication Charges	0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
PhD09-FBZSH3/AMR2.1-UDOFRIC	0,00		14 307,00	Consumables, Consumables course for animal experiment	0,00		0,00	
PhD12-FBZSH9-AptaTrich	0,00		4 000,00	Aptamers processing (Magnetic beads…), Aptamers processing (streptavidine-HRP), Aptamers validation	0,00		0,00	
PhD14-FBZ4-ToxSauQMRA	0,00		0,00		0,00		0,00	
P02-Ages	**0,00**		**6 000,00**		**4 700,00**		**3 480,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings 2022	0,00	
WP3	**0,00**		**6 000,00**		**3 700,00**		**3 480,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP15-AMR2.1-FED-AMR	0,00		6 000,00	qPCR; qPCR arrays, Consumables	0,00		3 480,00	Final meeting
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		1 400,00	Final meeting, WP6-meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		0,00		1 700,00	Consortium meeting	0,00	
P04-Sciensano	**0,00**		**43 881,00**		**17 330,00**		**4 400,00**	
WP1	**0,00**		**4 500,00**		**3 000,00**		**4 400,00**	
WP1-Coordination	0,00		4 500,00	Ethics reviewers	3 000,00	Governing meetings	4 400,00	4 PMT meetings
WP3	**0,00**		**36 530,00**		**12 230,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
ASM T&S-2022	0,00		0,00		3 000,00	1 FOC delegate, 2 VIP - PMT, 2 VIP - PhD	0,00	
JRP12-AMRSH5-FARMED	0,00		2 000,00	Lab consumables sequencing	1 500,00	Annual meeting	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		17 980,00	Administration (incl. Publication costs), Lab reagents for SMRT sequencing, Lab reagents for MGE investigation	3 080,00	Annual meeting at ECCMID 2022	0,00	
JRP16-ET2.2-TELE-Vir	0,00		2 000,00	Publication costs	1 250,00		0,00	
JRP23-FBZSH5-ADONIS	0,00		11 050,00	Administration (publications, posters), Lab reagents for WGS sequencing, Lab reagents for typing	1 400,00	Final meeting	0,00	
WP3-JRPs management	0,00		3 500,00	JRP/JIP external reviewers for 7 JRPs/JIPs reviews	2 000,00	Meeting	0,00	
WP4	**0,00**		**2 851,00**		**1 000,00**		**0,00**	
WP4-JIPs management	0,00		0,00		1 000,00	Meeting	0,00	
JIP06-COVID19-COVRIN	0,00		2 851,00	IndiMag Pathogen Kit , AgPath-ID™ One-Step RT-PCR Reagents , ELISA covid Kit (Idvet), IPMA reagents for molecular biology and sequencing animal experiment (1 chick breeded until 6 wks in a isolator : 50 euros),	0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
				Innate immunity - digital PCR - kit				
WP6	**0,00**		**0,00**		**1 100,00**		**0,00**	
PhD04-AMR2.1-KENTUCKY	0,00		0,00		1 100,00	Travel to INR (MGE Typing)	0,00	
P06-NDRVMI	**0,00**		**1 500,00**		**12 735,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**1 500,00**		**6 500,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP17-ET2.2-IDEMBRU	0,00		1 500,00	Data publication	1 400,00	Annual workshop (Final workshop, 2022, Teramo, Italy, 2 persons, 2 days, 2 nights)	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		4 500,00	Final meeting	0,00	
P07-SZU	**0,00**		**4 800,00**		**4 400,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**4 800,00**		**3 400,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP15-AMR2.1-FED-AMR	0,00		0,00		1 400,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP22-FBZ4.1-TOXOSOURCES	0,00		4 800,00		1 400,00	Final meeting	0,00	
P08-VRI	**0,00**		**22 554,00**		**12 050,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**20 950,00**		**10 350,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP19-ET1.1-PARADISE	0,00		2 500,00	Reagents for spiked RTE foodstuff, Reagents for PCR and sequencing (interlaboratory validation), Reagents for testing enrichment methods	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		5 000,00	Data analysis, administrative consumables, publication costs	2 500,00	Annual meeting, WP5 meeting	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		7 000,00	Administrative and laboratory consumables (laboratory plastic, sample collection, culture media etc.), Farm visits	3 750,00	Annual meeting, WP2 meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		6 450,00	Multicenter QMRA for T. gondii Testing of methods for the detection of T. gonndii on fresh produce Supply of T. gondii oocysts	2 100,00	Final meeting	0,00	
WP4	**0,00**		**1 604,00**		**700,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP06-COVID19-COVRIN	0,00		1 604,00	Reagents and kits (NA isolation, RT-qPCR)	700,00	Kick-off meeting	0,00	
P09-BfR	**0,00**		**44 745,00**		**28 510,00**		**0,00**	
WP1	**0,00**				**3 000,00**		**0,00**	
WP1-Coordination	0,00				3 000,00	Governing meetings	0,00	
WP3	**0,00**		**44 745,00**		**17 410,00**		**0,00**	
ASM T&S-2022	0,00		0,00		6 600,00	1 FOC delegate, 2 VIP - PMT, 8 VIP - STC	0,00	
JRP12-AMRSH5-FARMED	0,00		0,00		1 100,00	Annual meeting	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		3 100,00	Administration (incl. Publication costs)	560,00	Annual meeting at ECCMID 2022	0,00	
JRP15-AMR2.1-FED-AMR	0,00		1 600,00	Lab consumables (others), conference registration costs	1 600,00	Final meeting, Scientific conferences	0,00	
JRP17-ET2.2-IDEMBRU	0,00		7 500,00	Lab reagents, Sequencing (RNASeq)	1 400,00	Annual workshop (Final meeting, 2022, Italy, 2 participants, 2 days, 2 nights)	0,00	
JRP19-ET1.1-PARADISE	0,00		6 500,00	consumables and reagents for sending to ring trial participants transport costs for ring trial	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		450,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP21-FBZ3.1-BIOPIGEE	0,00		22 000,00	Publication cost Translation work for dissemination; products in WP6T1.2 and WP2.3 to be translated into at least 3 European languages	1 800,00	Final meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		4 045,00	Publication and dissemination costs consumables for analysis of field samples including plastic ware, elution buffers, DNA extraction kit, PCR reagents transport of field samples including dry ice transport of field samples including dry ice	1 400,00	Final meeting	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 100,00	Final meeting	0,00	
WP4	**0,00**		**0,00**		**6 100,00**		**0,00**	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		900,00	Final meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		4 500,00	Full consortium final meeting, WP5 workshop 3	0,00	
JIP06-COVID19-COVRIN	0,00		0,00		700,00	full consortium meeting	0,00	
WP5	**0,00**		**0,00**		**2 000,00**		**0,00**	
WP5-Science to Policy translation	0,00		0,00		2 000,00	Meetings	0,00	
P10-FLI	**0,00**		**83 720,00**		**30 825,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**59 753,00**		**21 825,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		10 095,00	Consumables, NGS Sequencing, Publication costs, Participation fees	4 875,00	Closing Meeting, Interlaboratory exchange meeting, Participation in scientific conference	0,00	
JRP15-AMR2.1-FED-AMR	0,00		11 384,00	Consumables, Publication costs, Participation fees	4 500,00	Final meeting Interlaboratory exchange Participation in scientific conference	0,00	
JRP17-ET2.2-IDEMBRU	0,00		8 274,00	Consumables, Publication costs	1 800,00	Annual meeting	0,00	
JRP18-ET1.1-MEmE	0,00		17 300,00	Consumables, Publication costs	5 750,00	Final Meeting, Rome, Conference costs	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		12 700,00	Consumables	3 300,00	Final meeting, Interlaboratory exchange	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 000,00	Annual meeting, Feb 2022, Denmark, Meeting regarding harmonisation and	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
						testing of metadata and ontologies from animal and food in Germany		
WP4	**0,00**		**23 967,00**		**8 000,00**		**0,00**	
JIP05-IA2.1-MATRIX	0,00		3 500,00	Publication costs, Participation fee costs	5 900,00	Final meeting, Participation in Scientific conference, Interlaboratory exchange meeting	0,00	
JIP06-COVID19-COVRIN	0,00		20 467,00	Consumables	2 100,00	Annual meeting	0,00	
P11-RKI	**0,00**		**16 700,00**		**6 900,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**16 700,00**		**5 900,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP19-ET1.1-PARADISE	0,00		15 200,00	Typing marker selection/development, Ring trial Nanobody development	600,00	Meeting	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		700,00	Final meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		1 500,00	Publication and dissemination costs	700,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP24-FBZSH9-BeONE	0,00		0,00		3 300,00	3rd Annual meeting, Feb 2022, Ad hoc meetings	0,00	
P12-DTU	**0,00**		**48 308,00**		**6 835,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**48 308,00**		**5 835,00**		**0,00**	
ASM T&S-2022	0,00		0,00		2 400,00	1 FOC delegate, 3 VIP - LOC	0,00	
JRP12-AMRSH5-FARMED	0,00		30 808,00	Sequencing, organisation annual meeting	0,00		0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		17 500,00	Administration (incl. Publication cost) Lab reagents for SMRT sequencing (incl. Proficiency test) Lab reagents for MGE investigation Computing for MGE investigations	560,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		2 175,00	Third annual project meeting and stakeholder workshop	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		0,00		700,00	Final meeting	0,00	
WP4	**0,00**		**0,00**		**0,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		0,00		0,00		0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
P13-SSI	**0,00**		**68 259,00**		**61 810,00**		**24 508,00**	
WP1	**0,00**				**3 000,00**		**0,00**	
WP1-Coordination	0,00				3 000,00	governing meetings	0,00	
WP3	**0,00**		**42 259,00**		**25 200,00**		**9 325,00**	
ASM T&S-2022	0,00		0,00		3 600,00	1 FOC delegate, 2 VIP - PMT 3 VIP - LOC	0,00	
JRP12-AMRSH5-FARMED	0,00		0,00		1 400,00	Final meeting	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		4 959,00	Flowcells and reagens for PT follow-up Reagens for sequencing	2 200,00	Final meeting/2 persons	0,00	
JRP15-AMR2.1-FED-AMR	0,00		2 000,00	Publication fees	1 400,00	Final meeting	0,00	
JRP16-ET2.2-TELE-Vir	0,00		2 000,00	Other reagents and enzymes	0,00		3 925,00	Poi-Toolbox Workshop, January 2022, SSI, Denmark 2nd TELE-Vir meeting, January 2022, SSI, Denmark
JRP18-ET1.1-MEmE	0,00		12 000,00	Consumables, International courrier, Publication fees	3 050,00	National congress of Italian Society of Parasitology (SOIPA 2022) Other international meetings for	0,00	Final meeting with final disseminatio n (Rome)

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
						dissemination of results		
JRP19-ET1.1-PARADISE	0,00		12 000,00	Reagents and kits	6 250,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		1 200,00	Publication costs	2 100,00	Final, June 2022, ISS, 2 days, 3 persons	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		2 100,00	Publication and dissemination costs	2 800,00	Final meeting	3 600,00	Final meeting
JRP23-FBZSH5-ADONIS	0,00		6 000,00	Lab consumables, Publication Fees	1 400,00	Final meeting, 2 persons	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		0,00		1 800,00	3rd Annual meeting, Feb 2022, Denmark, 20 participants, 2 days, 1 night
WP3-JRPs management	0,00		0,00		1 000,00	Meeting	0,00	
WP4	**0,00**		**26 000,00**		**31 610,00**		**15 183,00**	
JIP03-IA2.3-CARE	0,00		0,00		0,00		4 463,00	Closing meeting Workshop, MATRIX, HARMONY CAP, CARE

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP04-IA2.2-OH-HARMONY CAP	0,00		24 000,00	Laboratory Consumables for AMR-training workshop at SSI, Publications	7 050,00	Training in STEC/ETEC. ISS, Rome Training in Parasites. ISS, Rome STEC/ETEC training personal, ISS, Rome EJP annual scientific meeting	7 045,00	Final Meeting and Joint workshop Joint workshop with CARE and MATRIX
JIP05-IA2.1-MATRIX	0,00		2 000,00	Publication fees	24 560,00	Budget temporarily placed to coordinating partner following withdrawal of P12-DTU e.g. for supporting more participants to final project meeting	3 675,00	Biannual meeting (no 5) Joint workshop (MATRIX & OH-HARMONY-CAP)
WP5	**0,00**		**0,00**		**2 000,00**		**0,00**	
WP5-Science to Policy translation	0,00		0,00		2 000,00	Meetings	0,00	
P14-UT	**0,00**		**10 200,00**		**12 800,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**10 200,00**		**11 800,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		0,00		4 600,00	Consortium meetings	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP15-AMR2.1-FED-AMR	0,00		6 900,00	Consumables, Conference participation fees	5 900,00	Final meeting, Inter-laboratory exchange, Participation in scientific conference	0,00	
JRP18-ET1.1-MEmE	0,00		3 300,00	Consumables for molecular studies	700,00	Final meeting	0,00	
P15-VFL	**0,00**		**0,00**		**5 550,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings 2022	0,00	
WP3	**0,00**		**0,00**		**4 550,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP18-ET1.1-MEmE	0,00		0,00		2 550,00	Final meeting Y5 (Rome), Congress for dissemination of results	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		1 400,00	Final meeting	0,00	
P16-INIA	**0,00**		**10 955,00**		**15 600,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings 2022	0,00	
WP3	**0,00**		**6 300,00**		**2 600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		0,00		0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP16-ET2.2-TELE-Vir	0,00		6 300,00	Consumables, Molecular biology reagents	2 000,00	2nd TELE-Vir meeting, January 2022, SSI, Denmark Poi-Toolbox Workshop, January 2022, SSI, Denmark	0,00	
WP4	**0,00**		**4 655,00**		**5 550,00**		**0,00**	
JIP05-IA2.1-MATRIX	0,00		0,00		3 400,00	Annual MATRIX meeting, Annual EJP meeting, Congress	0,00	
JIP06-COVID19-COVRIN	0,00		4 655,00	Sientific publication in scientific journals, revision and translation of articles, Registration fee for the attendance to Congress and Courses, Poster impression, design and creation of figures for the scientific publication, Material for laboratory analysis: reagents for molecular analysis, plastics and consumables (including for pets sampling) Development online surveys	2 150,00	SEE SPAIN/PORTUGAL 2022, Covrin Annual meeting	0,00	
WP6	**0,00**		**0,00**		**6 450,00**		**0,00**	
STM-2022	0,00		0,00		6 450,00	Short Term mission at RIVM	0,00	
P17-UCM	**0,00**		**37 576,00**		**17 550,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1	**0,00**				**3 000,00**		**0,00**	
WP1-Coordination	0,00				3 000,00	Governing meetings 2022	0,00	
WP2	**0,00**		**0,00**		**2 000,00**		**0,00**	
WP2-SRA	0,00		0,00		2 000,00	Meetings 2022	0,00	
WP3	**0,00**		**34 460,00**		**8 800,00**		**0,00**	
ASM T&S-2022	0,00		0,00		3 000,00	1 FOC delegate - 2 VIP PMT - 2 VIP PHD	0,00	
JRP12-AMRSH5-FARMED	0,00		6 000,00	Sequencing material for MinIon, Illumina Sequencing and Lab material for molecular Biology - Sampling and onsite testing	1 000,00	Annual meeting 2022	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		7 000,00	On-site testing, laboratory control material, molecular biology	1 500,00	Annual scientific meeting 2022	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		960,00	Analysis - Publication	1 100,00	Final meeting of the project	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		19 500,00	Consumables needed for WP3 (DNA extraction, PCR, package delivery) - Consumables for Task 4.3. Exploring the prevalence of oocyst-derived infections in animals and in humans - Consumables needed for WP5 Pilot studies (samples/ isolates analysis byNGS-MLST genotyping method)	1 100,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP23-FBZSH5-ADONIS	0,00		1 000,00		1 100,00		0,00	
WP4	**0,00**		**3 116,00**		**3 750,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		1 800,00	Reagents; consumables and material for PT; material for RM; WGS; Publication	1 550,00	Closing meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		2 200,00	Bi-annual meeting 5 - WP3 meeting	0,00	
JIP06-COVID19-COVRIN	0,00		1 316,00	LAB CONSUMABLES	0,00		0,00	
WP6	**0,00**		**0,00**		**0,00**		**0,00**	
PhD01-AMR2-ECO-HEN	0,00		0,00		0,00		0,00	
PhD05-AMR2/6.1/ET5-METAPRO	0,00		0,00		0,00		0,00	
P18-MVNA	**0,00**		**0,00**		**1 100,00**		**0,00**	
WP1	**0,00**				**500,00**		**0,00**	
WP1-Coordination	0,00				500,00	Governing meetings 2022	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
P19-INRAE	**0,00**		**14 036,00**		**4 510,00**		**0,00**	
WP1	0,00				1 000,00		0,00	
WP1-Coordination	0,00				1 000,00	Governing meetings 2022	0,00	
WP3	0,00		4 100,00		1 160,00		0,00	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		4 100,00	Consumables for functional characterization of MGE	560,00	Annual meeting 2022	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP4	0,00		9 936,00		2 350,00		0,00	
JIP03-IA2.3-CARE	0,00		9 936,00	Consumables for strain characterization analysis (Bacteriology, Mass Spectrometry, Molecular biology) and sequencing services - Consumables for integrating strains in collection (Bacteriology, Mass Spectrometry, Molecular biology, sequencing services and preservation) - Consumables for IT development, data storage costs (in data center or in house)	2 350,00	Closing meeting - Meeting 1 with MIRRI/Eosc partners - Meeting 2 with MIRRI/Eosc partners	0,00	
P20-IP	**0,00**		**23 248,00**		**4 775,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings 2022	0,00	
WP3	**0,00**		**5 248,00**		**2 200,00**		**0,00**	
ASM T&S-2022	0,00		0,00		1 200,00	1 FOC delegate - 1 VIP PHD	0,00	
JRP15-AMR2.1-FED-AMR	0,00		0,00		300,00	Final report meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		5 248,00	DNA preparation and High Throughput Sequencing - Sequencing Analysis - Phenotypic experiments	700,00	Adonis Y3 meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP4	**0,00**		**18 000,00**		**1 575,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		18 000,00	Sequencing and Characterization	1 575,00	Closing meeting - Meeting 1 with MIRRI/Eosc partners - Meeting 2 with MIRRI/Eosc partners	0,00	
WP6	**0,00**		**0,00**		**0,00**		**0,00**	
PhD16-FBZ2/AMR6.1-Codes4strains	0,00		0,00		0,00		0,00	
P21-APHA	**8 213,00**		**78 457,00**		**32 900,00**		**5 625,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**8 213,00**		**32 686,00**		**17 417,00**		**0,00**	
ASM T&S-2022	0,00		0,00		1 800,00	1 FOC delegate - 2 VIP PHD	0,00	
JRP12-AMRSH5-FARMED	8 213,00	VolTRAX V2	9 367,00	Consumables - Cloud storage - Admin	3 280,00	Project update	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		11 520,00	Consumables - Cloud storage - Administration (publishing, etc)	1 440,00	Final meeting	0,00	
JRP17-ET2.2-IDEMBRU	0,00		2 933,00	Cloud computing	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		2 933,00	Consumables Farm (VTEC) - Consumables Lab (VTEC) - Consumable extract (VTEC) - Consumables Seq (CSU) - Cloud storage - Consumables Salmonella	2 347,00	Project meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		4 100,00	Kick-off meeting - Mid-term meeting - Final meeting - WP3 meeting - WP4 meeting - WP6 meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		2 933,00	Cloud	1 950,00	Project meeting Y3	0,00	
JRP24-FBZSH9-BeONE	0,00		3 000,00	Cloud storage	1 100,00	3rd annual meeting	0,00	
WP4	**0,00**		**39 494,00**		**7 799,00**		**5 625,00**	
JIP03-IA2.3-CARE			7 802,00	Consumables (standard laboratory supplies including buffers, sequencing reagents)	879,00	Meeting for Y3	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		19 360,00	Consumables - Dynabeads (ThermoFisher scientific) - Seq consumables - Cloud storage	4 720,00	Final meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		3 500,00	Specalist IT e.g. cloud computing and storage	2 200,00	Biannual meeting - WP3 meeting	5 625,00	
JIP06-COVID19-COVRIN	0,00		8 832,00	Ferret purchase - Consumables - Microchips - Ferret Transport - Ferret B&B with staff component removed	0,00		0,00	
WP6	**0,00**		**6 277,00**		**6 684,00**		**0,00**	
PhD09-FBZSH3/AMR2.1-UDOFRIC	0,00		6 277,00	Consumables	500,00	Meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
PhD10-FBZSH3/AMR2.1-WILBR	0,00		0,00		840,00	Sampling PhD - Sampling wildlife	0,00	
STM-2022	0,00		0,00		5 344,00	Hotel accommodation - Subsistence - Travel costs	0,00	
P22-PHE	**0,00**		**0,00**		**4 900,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		0,00	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**3 900,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		1 100,00	Annual meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		0,00		1 100,00	Annual meeting	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 100,00	3rd annual meeting	0,00	
P23-UoS	**0,00**		**31 348,00**		**34 840,00**		**209 465,00**	
WP1	**0,00**		**0,00**		**5 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		5 000,00	Governing meetings	0,00	
WP3	**0,00**		**27 048,00**		**10 750,00**		**0,00**	
ASM T&S-2022	0,00		0,00		4 200,00	1 FOC delegate - 4 VIP PMT - 2 VIP PHD	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		5 000,00	Consumables - General laboratory consumables	1 000,00	Final project review meeting	0,00	
JRP15-AMR2.1-FED-AMR	0,00		9 000,00	Consumables	2 100,00	End of project meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP16-ET2.2-TELE-Vir	0,00		5 900,00	Consumables - Access	2 000,00	2nd TELE-Vir meeting - POI Toolbox workshop	0,00	
JRP19-ET1.1-PARADISE	0,00		5 000,00	Consumables for developing, testing and inter-laboratory comparison on typing schemes	750,00	Final meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		2 148,00	Consumables for sample collection and oocyst recovery - transport of field samples including dry ice	700,00	Final meeting	0,00	
WP4	**0,00**		**4 300,00**		**1 200,00**		**0,00**	
JIP05-IA2.1-MATRIX	0,00		0,00		700,00	Consortium meeting	0,00	
JIP06-COVID19-COVRIN	0,00		4 300,00		500,00	Project meetings	0,00	
WP6	**0,00**		**0,00**		**17 890,00**		**209 465,00**	
PhD07-ET2.1-MACE	0,00		0,00		2 100,00	Meeting	0,00	
PhD11-FBZ4/5-EnvDis								
STM-2022	0,00		0,00		6 300,00	2-way flexible flight ticket - Accommodation - Subsistence	0,00	
WP6-T&E management	0,00		0,00		4 000,00	Meeting		

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WS-2022	0,00		0,00		5 490,00	Travel costs for Marwa Hassan (to be confirmed) - Travel costs for Owen Higgins (to be confirmed) - Travel costs for an additional support staff/student (to be confirmed) - Travel costs for speakers (to be confirmed)	7 465,00	Diagnostic workshop - Organizers/Speakers - WP6, communication team and other support staff
P24-NNK	**0,00**		**1 300,00**		**3 000,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**1 300,00**		**2 000,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP19-ET1.1-PARADISE	0,00		1 300,00	Reagents (PCR, gel electrophoresis, sequencing) - Shipment cost	1 400,00	Final meeting	0,00	
P25-NUIG	**0,00**		**4 700,00**		**2 700,00**		**350,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**4 700,00**		**1 700,00**		**350,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		4 700,00	Research consumables	1 100,00	Final meeting	350,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP15-AMR2.1-FED-AMR	0,00		0,00		0,00		0,00	
P26-TEAGASC	**0,00**		**8 483,00**		**8 355,00**		0,00	
WP1	**0,00**				**1 000,00**			
WP1-Coordination	0,00				1 000,00	Governing meetings		
WP3	**0,00**		**0,00**		**2 900,00**		**0,00**	
ASM T&S-2022	0,00		0,00		1 200,00	1 FOC delegate - 1 VIP PHD	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		1 700,00	Final meeting	0,00	
WP4	**0,00**		**0,00**		**2 430,00**		**0,00**	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		2 430,00	Project meeting Y3 - Technical meeting course	0,00	
WP6	**0,00**		**8 483,00**		**2 025,00**		**0,00**	
PhD03-AMR2.1-HME-AMR	0,00		8 483,00	Laboratory consumables, PCR kits, sequencing costs	2 025,00	Travel and subsistence costs- project meetings, international conference - OHEJP meeting	0,00	
P27-ISS	**0,00**		**186 382,00**		**21 910,00**		**27 794,00**	
WP1	**0,00**				**2 000,00**		**0,00**	
WP1-Coordination	0,00				2 000,00	Governing meetings	0,00	
WP3	**0,00**		**147 582,00**		**12 460,00**		**25 694,00**	
ASM org-2022			65 000,00	Organisation costs				
ASM T&S-2022	0,00		0,00		1 200,00	1 FOC delegate - 1 VIP PMT	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP12-AMRSH5-FARMED	0,00		8 000,00	Reagents and consumables for Resfinder-"like" experiments - Reagents and consumables for benchmarking experiments - Reagents and consumables for metagenomics and sample preparation - Publication cost	1 400,00	Final meeting	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		11 840,00	Lab reagents for SMRT sequencing - Lab reagents for MGE investigation	560,00	Annual meeting	0,00	
JRP18-ET1.1-MEmE	0,00		12 000,00	Consumables - International courrier - Publication fees	3 500,00	National congress of Italian Society of Parasitology (SOIPA 2022) - Other international meetings for dissemination of results	18 000,00	
JRP19-ET1.1-PARADISE	0,00		37 400,00	Reagents and kits	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		0,00		7 694,00	Final meeting
JRP21-FBZ3.1-BIOPIGEE	0,00		1 000,00	Sequencing services and reagents for sequencing	900,00	Kick-off meeting - Mid-term meeting - Final meeting - WP3 meeting - WP4 meeting - WP6 meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP22-FBZ4.1-TOXOSOURCES	0,00		7 130,00	Consumables	2 100,00	Final meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		5 212,00	Lab reagents and services for WGS sequencing	1 400,00	3rd meeting ADONIS	0,00	
WP4	**0,00**		**38 800,00**		**6 450,00**		**2 100,00**	
JIP03-IA2.3-CARE	0,00		18 000,00	Sequencing reagents for filling gaps in reference materials	2 025,00	Closing meeting - Participation in congresses to present the project results	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		15 000,00	Materials for the training sessions on pathogenic E. coli and parasites	2 850,00	Final meeting and joint workshop with CARE and Matrix	2 100,00	Third meeting
JIP05-IA2.1-MATRIX	0,00		0,00		1 575,00	General meeting - WP5 meeting	0,00	
JIP06-COVID19-COVRIN	0,00		5 800,00	Consumable for molecular biology and NGS	0,00		0,00	
WP7	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP7-Sustainability	0,00		0,00		1 000,00	Various meetings	0,00	
P28-IZS AM	**0,00**		**38 552,00**		**11 550,00**		**9 892,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**14 200,00**		**7 200,00**		**9 892,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP12-AMRSH5-FARMED	0,00		7 000,00	Reagents and consumables for benchmarking experiments - Reagents and consumables for	1 400,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
				metagenomics and sample preparation - publication fees				
JRP16-ET2.2-TELE-Vir	0,00		3 200,00	Publications	4 100,00	2nd TELE-Vir meeting - POI Toolbox workshop - POI in the field	0,00	
JRP17-ET2.2-IDEMBRU	0,00		4 000,00	Materials for supporting the publication of the toolkit - publication fees	0,00		2 685,00	Annual workshop
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		0,00		7 207,00	Kick-off meeting - Mid-term meeting - Final meeting - WP3 meeting - WP4 meeting - WP6 meeting
JRP24-FBZSH9-BeONE	0,00		0,00		1 100,00	3rd meeting	0,00	
WP4	**0,00**		**24 352,00**		**3 350,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		1 000,00	Plastic	700,00	Final meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		2 650,00	WP T0 meeting - WP5 meeting	0,00	
JIP06-COVID19-COVRIN	0,00		23 352,00	Model costs - Reagents for animal work, NGS, and molecular biology	0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
P29-IZS LER	**0,00**		**29 500,00**		**8 950,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**4 000,00**		**6 600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP16-ET2.2-TELE-Vir	0,00		2 000,00	Other reagents and enzymes	4 200,00	2nd TELE-Vir meeting - POI Toolbox workshop - POI in the field	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		2 000,00	Organization of workshops (WP6)	1 800,00	Final meeting	0,00	
WP4	**0,00**		**25 500,00**		**1 350,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		20 000,00	Reagents for strain purification and characterization, including genotyping or whole genome sequencing - Reagents for quality test of batches - Storage, mantainance, shipment	1 350,00	Closing meeting	0,00	
JIP06-COVID19-COVRIN	0,00		5 500,00	serological kits, plastics and reagent for serology - reagents for molecular biology - reagents and plastics for virus isolation	0,00		0,00	
P30-RIVM	**0,00**		**45 388,00**		**32 183,00**		**8 900,00**	
WP1	**0,00**				**3 000,00**		**0,00**	
WP1-Coordination	0,00				3 000,00	Governing meetings	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP2	**0,00**		**0,00**		**2 000,00**		**0,00**	
WP2-SRA	0,00		0,00		2 000,00		0,00	
WP3	**0,00**		**39 334,00**		**21 483,00**		**5 000,00**	
ASM T&S-2022	0,00		0,00		2 400,00	1 FOC delegate - 1 VIP PMT - 2 VIP PHD	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		16 667,00	Sequencing costs	1 500,00	Project meetings	0,00	
JRP18-ET1.1-MEmE	0,00		2 000,00	Consumables	2 250,00	Final meeting Y5 - Training 1 (exchange of key staff members)	0,00	
JRP19-ET1.1-PARADISE	0,00		4 000,00	Post-DNA enrichment method	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		3 333,00	Project meetings	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		0,00		0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		0,00		2 800,00	Final meeting - WP meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		16 667,00	Sequencing costs	2 800,00	Project meetings	5 000,00	Annual project meeting
JRP24-FBZSH9-BeONE	0,00		0,00		5 000,00	3rd annual meeting	0,00	
WP4	**0,00**		**1 000,00**		**5 700,00**		**3 900,00**	
JIP03-IA2.3-CARE	0,00		1 000,00	Chemicals	1 050,00	Closing meeting	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		3 200,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP05-IA2.1-MATRIX	0,00		0,00		1 450,00	Consortium meeting	3 900,00	Organisation of workshop within WP5
JIP06-COVID19-COVRIN	0,00		0,00		0,00		0,00	
WP6	**0,00**		**5 054,00**		**0,00**		**0,00**	
PhD08-ET5.1/4.1/FBZSH3-DESIRE	0,00		5 054,00	Bench fee (Lab material) - Sequencing costs - Education WIAS	0,00		0,00	
PhD15-FBZ5-TRACE	0,00		0,00		0,00		0,00	
P31-WbvR	**0,00**		**62 088,00**		**32 350,00**		**2 000,00**	
WP1	**0,00**				**2 000,00**		**0,00**	
WP1-Coordination	0,00				2 000,00	Governing meetings	0,00	
WP3	**0,00**		**48 650,00**		**18 050,00**		**0,00**	
ASM T&S-2022	0,00		0,00		1 800,00	1 FOC delegate - 1 VIP PMT - 1 VIP PHD	0,00	
JRP12-AMRSH5-FARMED	0,00		25 450,00	Reagents and consumables for sample preparation, culturing, spiking, DNA purification, MinION and Illumina sequencing - Reagents and consumables for sample preparation, Voltrax, DNA purification, MinION sequencing	550,00	Final meeting	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		5 000,00	Lab reagents for SMRT sequencing (incl. Proficiency test) - Lab	1 000,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
				reagents for MGE investigation - Other lab materials and publication costs				
JRP17-ET2.2-IDEMBRU	0,00		10 000,00	Transport of strains - Strains preparation for in vivo experiments	1 400,00	Final workshop	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		2 800,00	Final meeting - WP meeting	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		4 400,00	consumables for sampling - post costs for sending samples to lab - travelling to farms - unforeseen - Consumable virus culture	7 700,00	Kick-off meeting - Mid-term meeting - Final meeting - WP3 meeting - WP4 meeting - WP6 meeting - WP2 visits	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		500,00	Materials	700,00	Final meeting	0,00	
JRP23-FBZSH5-ADONIS	0,00		3 300,00	Salmonella isolates sequencing - sampling on farms	2 100,00	Closing meeting	0,00	
WP4	**0,00**		**13 438,00**		**2 550,00**		**2 000,00**	
JIP03-IA2.3-CARE	0,00		3 000,00	Labmaterials	1 050,00	Closing meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		1 000,00	Disposables and consumables laboratory	1 500,00	Final meeting	0,00	
JIP06-COVID19-COVRIN	0,00		9 438,00	Consumables and disposables	0,00		2 000,00	Kick-off meeting
WP6	**0,00**		**0,00**		**9 750,00**		**0,00**	
PhD13-FBZ8/AMR2-VIMOGUT-AMR	0,00		0,00		0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
PhD15-FBZ5-TRACE	0,00		0,00		0,00		0,00	
STM-2022	0,00		0,00		7 750,00	STM-2022	0,00	
WP6-T&E management	0,00		0,00		2 000,00	Travel WP6	0,00	
P32-FHI	**0,00**		**9 500,00**		**14 750,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**5 500,00**		**4 550,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		2 000,00	APC	2 600,00	meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		1 500,00	Publication and dissemination costs	700,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP24-FBZSH9-BeONE	0,00		2 000,00	APC	650,00	3rd Annual meeting, Feb 2022, Denmark, 20 participants, 2 days, 1 night	0,00	
WP4	**0,00**		**4 000,00**		**9 200,00**		**0,00**	
JIP04-IA2.2-OH-HARMONY CAP	0,00		2 000,00	APC	1 800,00	meeting SSI, Copenhagen	0,00	
JIP05-IA2.1-MATRIX	0,00		2 000,00	APC	7 400,00	biannual_meeting 5, SSI Denmark, 4, 2,2 WP meeting	0,00	
P33-NVI	**0,00**		**33 137,00**		**28 713,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1	**0,00**				**1 000,00**			
WP1-Coordination	0,00				1 000,00	Governing meetings		
WP3	**0,00**		**22 046,00**		**15 720,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		5 123,00	Administration (incl publication) Lab reagents for SMRT sequencing	770,00	ECCMID	0,00	
JRP15-AMR2.1-FED-AMR	0,00		2 900,00	Article publication cost Administration costs	1 700,00	Final report meeting	0,00	
JRP16-ET2.2-TELE-Vir	0,00		0,00		3 350,00	2nd TELE-Vir meeting, January 2022, SSI, Denmark Poi-Toolbox Workshop, January 2022, SSI, Denmark	0,00	
JRP18-ET1.1-MEmE	0,00		1 500,00	Consumables	2 100,00	Final meeting Y5 (Rome)	0,00	
JRP19-ET1.1-PARADISE	0,00		4 500,00	Reagents for inter-laboratory assay Reagents for inter-laboratory assay	1 400,00	Final meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		2 726,00	Administration Article Publication Charge (APC)	1 400,00	Project meeting, close to end	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		900,00	Kick-off meeting Mid-term meeting Final meeting WP3-meeting WP4-meeting WP6-meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		5 297,00	Consumables WP5 (DNA purification & shipment)	2 100,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 400,00	3rd Annual meeting, Feb 2022, Denmark, 20 participants, 2 days, 1 night	0,00	
WP4	**0,00**		**11 091,00**		**11 993,00**		**0,00**	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		2 268,00	Final meeting, Copenhagen	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		7 900,00	plenary meeting WP meeting final meeting	0,00	
WP4-JIPs management	0,00		0,00		1 000,00	meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP06-COVID19-COVRIN	0,00		11 091,00	Sampling tubes and reagents RT-qPCR assays and reagents ELISA Bio-plex (Luminex) reagents Cell media etc for culturing RT-qPCR assay, antibodies and reagents Prep samples RNASeq RNASeq costs	825,00	Mid-term WP/task meeting	0,00	
P34-PIWET	**0,00**		**73 170,00**		**22 950,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**32 426,00**		**17 100,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		3 026,00	Sequencing consumables	1 000,00	Annual meeting at ECCMID 2022	0,00	
JRP15-AMR2.1-FED-AMR	0,00		9 500,00	Chemical reagents and analytical standards of antibiotics Disposables - Laboratory equipment (vials, tubes, filters, laboratory glass, blenders, equipment for sample storage, laboratory stirrer, needles, syringes, laboratory pipettes,	0,00		0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
				cartridges) LC-MS/MS analytical columns and consumables for LC-MS/MS system Services of equipment required for samples analysis				
JRP16-ET2.2-TELE-Vir	0,00		5 000,00	analytical test reagents and kits disposables (i.e. plastics) services (sampling)	2 500,00	2nd TELE-Vir meeting, January 2022, SSI, Denmark Poi-Toolbox Workshop, January 2022, SSI, Denmark	0,00	
JRP18-ET1.1-MEmE	0,00		1 400,00	analytical test reagents and kits disposables (i.e. plastics) services (i.e. sampling, shipment)	1 400,00	Final meeting in Rome 2022 (Italy)	0,00	
JRP19-ET1.1-PARADISE	0,00		0,00		1 100,00	Annual meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		4 800,00	annual meeting (The third annual meeting, June 2022, Italy (ISS))	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		0,00		1 800,00	Final meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP22-FBZ4.1-TOXOSOURCES	0,00		8 000,00	analytical test reagents and kits disposables (i.e. plastics)	1 400,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP23-FBZSH5-ADONIS	0,00		5 500,00	analytical test reagents and kits disposables (i.e. plastics) services (i.e. sampling, shipment)	1 400,00	2nd Annual meeting	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 100,00	3rd Annual meeting, Feb 2022, Denmark, 20 participants, 2 days, 1 night	0,00	
WP4	**0,00**		**40 744,00**		**4 850,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		15 000,00	analytical test reagents and kits disposables (i.e. plastics) services (i.e. sampling, shipment)	1 350,00	Closing meeting (1½ days), in Copenhagen, 2022	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		2 700,00	Final Meeting in Copenhagen	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		800,00	Final meeting Y5 ICOPAnhagen	0,00	
JIP06-COVID19-COVRIN	0,00		25 744,00	test reagents disposables services i.e. sampling, DNA sequencing, shipment	0,00		0,00	
P35-INIAV	**0,00**		**11 430,00**		**24 810,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**6 800,00**		**10 410,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP17-ET2.2-IDEMBRU	0,00		2 000,00	Dissemination (scientific papers and conference contributions)	1 700,00	Annual workshop (Final meeting, 2022, Italy, 2 participants, 2 days, 2 nights)	0,00	
JRP18-ET1.1-MEmE	0,00		2 800,00	Reagents and Consumables	2 250,00	Final meeting Y5 (Rome) Training 1 (exchange of key staff members)	0,00	
JRP19-ET1.1-PARADISE	0,00		0,00		1 100,00	Final Meeting	0,00	
JRP20-FBZSH3-DISCoVeR	0,00		0,00		1 760,00	Final meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		0,00		1 400,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP23-FBZSH5-ADONIS	0,00		2 000,00	Consumables and reagents for mutants creation and testing	1 600,00	Final meeting	0,00	
WP4	**0,00**		**4 630,00**		**10 100,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		10 100,00	Final meeting, SSI, CPH, Denmark Training STEC/ETEC at ISS, Rome Training Parasites at ISS, Rome Training AMR for salmonella and Campy at SSI, CPH	0,00	
JIP06-COVID19-COVRIN	0,00		4 630,00	Project Management and communication expenses Reagents and consumables for RNA extraction and RT-PCR Reagents and consumables for serology Reagents and consumables for NGS Expenses involved in risk assessment and surveillance	0,00		0,00	
WP6	**0,00**		**0,00**		**3 300,00**		**0,00**	
STM-2022	0,00		0,00		3 300,00	STM mission - SURVEILLANCE AND SOURCE-ATTRIBUTION OF AMR BASED ON METAGENOMIC ANALYSIS	0,00	
P36-INSA	**0,00**		**49 270,00**		**30 885,00**		**0,00**	
WP1	**0,00**				**2 000,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1-Coordination	0,00				2 000,00	Governing meetings	0,00	
WP3	**0,00**		**36 900,00**		**17 535,00**		**0,00**	
ASM T&S-2022	0,00		0,00		1 200,00	1 FOC delegate 1 VIP - PMT	0,00	
JRP13-AMRSH5-WORLDCOM	0,00		8 300,00	Lab reagents for multiplex Lab reagents feasibility testing	1 000,00	Annual meeting at ECCMID 2022 (Closing meeting)	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		11 500,00	Lab reagents for SMRT sequencing Lab reagents for MGE investigation	560,00	Annual meeting at ECCMID 2022	0,00	
JRP15-AMR2.1-FED-AMR	0,00		2 000,00	Publication fee	3 400,00	Final meeting	0,00	
JRP16-ET2.2-TELE-Vir	0,00		0,00		1 250,00	2nd TELE-Vir meeting (Jan 2022) Poi-Toolbox Workshop	0,00	
JRP17-ET2.2-IDEMBRU	0,00		9 000,00	Reagents and consumables for whole genome sequencing and molecular typing Dissemination (scientific papers and conference contributions)	1 400,00	Annual workshop (Final meeting, 2022, Italy, 2 participants, 2 days, 2 nights)	0,00	
JRP18-ET1.1-MEmE	0,00		2 000,00	Reagents	3 500,00	Final meeting Y5 (Rome)	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
						Conference meetings		
JRP20-FBZSH3-DISCoVeR	0,00		2 000,00	Contacts with national partners	2 025,00	final anual meeting	0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		1 100,00	TBC	700,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
JRP23-FBZSH5-ADONIS	0,00		1 000,00	Consumables for phenotypic, stress response and fitness tests	1 400,00	Annual metting	0,00	
JRP24-FBZSH9-BeONE	0,00		0,00		1 100,00	3rd Annual meeting, Feb 2022, Denmark, 20 participants, 2 days, 1 night	0,00	
WP4	**0,00**		**12 370,00**		**11 350,00**		**0,00**	
JIP04-IA2.2-OH-HARMONY CAP	0,00		6 000,00	Dissemination of project findings	6 300,00	final meeting and workhops	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP05-IA2.1-MATRIX	0,00		6 370,00	Contacts with national partners Actions to the project progress updates at AMR level Actions to evaluate the applicability and suitability of the developed common framework for OH surveillance, mainly at AMR level Actions to identifying the similarities among tracks, and producing a common OHS framework, manly at AMR level Actions to select the appropriate members of AH, PH and FS competent authorities, and to identifying the thresholds and boundaries of the metrics and the frequency of evaluation for the country/partner	4 050,00	Bi-annual meeting WP meeting Bi-annual meeting 5 at SSI (INSA_AMR)		
WP4-JIPs management	0,00		0,00		1 000,00	meeting	0,00	
JIP06-COVID19-COVRIN	0,00		0,00		0,00		0,00	
P37-IISPV	**0,00**		**0,00**		**1 600,00**		**0,00**	
WP1	**0,00**				**1 000,00**			

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1-Coordination	0,00				1 000,00	Governing meetings		
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
P39-SLV	**0,00**		**4 787,00**		**5 250,00**		**0,00**	
WP1	**0,00**				**1 000,00**			
WP1-Coordination	0,00				1 000,00	Governing meetings		
WP3	**0,00**		**4 787,00**		**1 300,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
JRP19-ET1.1-PARADISE	0,00		4 787,00	Reagents, primer/probes etc Consumables (plasitics, gloves etc)	0,00		0,00	
JRP22-FBZ4.1-TOXOSOURCES	0,00		0,00		700,00	Final meeting. To be held in connection to OHEJP ASM.	0,00	
WP4	**0,00**		**0,00**		**2 950,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		0,00		1 050,00	closing meeting, 2 days, 1 night	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		1 900,00	Meeting, 3 nights	0,00	
P40-FoHM	**0,00**		**6 544,00**		**7 015,00**		**0,00**	
WP1	**0,00**				**1 000,00**		**0,00**	
WP1-Coordination	0,00				1 000,00	Governing meetings	0,00	
WP3	**0,00**		**6 544,00**		**1 865,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JRP14-AMR2.1-FULL-FORCE	0,00		5 044,00	Administration (incl. Task leaders for T2.3) Consumables for sequencing	565,00	Annual meeting at ECCMID 2022	0,00	
JRP19-ET1.1-PARADISE	0,00		1 500,00	Reagents	700,00	Annual meeting 2	0,00	
WP4	**0,00**		**0,00**		**4 150,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		0,00		1 450,00	closing meeting, 2 days, 1 night	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		1 500,00	Final meeting 1	0,00	
JIP05-IA2.1-MATRIX	0,00		0,00		1 200,00	Annual meeting	0,00	
P41-SVA	**0,00**		**55 807,00**		**33 245,00**		**20 520,00**	
WP1	**0,00**				**4 000,00**		**0,00**	
WP1-Coordination	0,00				4 000,00	Governing meetings	0,00	
WP3	**0,00**		**34 200,00**		**13 970,00**		**15 600,00**	
ASM T&S-2022	0,00		0,00		3 000,00	1 FOC delegate 3 VIP - PMT 1 VIP - PhD	0,00	
JRP14-AMR2.1-FULL-FORCE	0,00		0,00		2 070,00	Project and final Meeting	0,00	
JRP16-ET2.2-TELE-Vir	0,00		1 500,00	utensiles Other reagents and enzymes	2 250,00	2nd TELE-Vir meeting, January 2022, SSI, Denmark Poi-Toolbox	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
						Workshop, January 2022, SSI, Denmark		
JRP18-ET1.1-MEmE	0,00		2 500,00	Plastics, reagents and consumables	1 400,00	Final meeting Y5 (Rome)	0,00	
JRP19-ET1.1-PARADISE	0,00		25 000,00	Reagents for development of hybridization capture probes Publication cost	0,00		6 100,00	Annual meeting
JRP20-FBZSH3-DISCoVeR	0,00		0,00		1 650,00	Consortium meeting	0,00	
JRP21-FBZ3.1-BIOPIGEE	0,00		5 200,00	Computer for Marie Sjölund Publication costs	3 600,00	Kick-off meeting Mid-term meeting Final meeting WP3-meeting WP4-meeting WP6-meeting	9 500,00	Kick-off meeting Mid-term meeting Final meeting WP3-meeting WP4-meeting WP6-meeting Workshop 3 JRP
JRP22-FBZ4.1-TOXOSOURCES	0,00		0,00		0,00		0,00	
WP4	**0,00**		**21 607,00**		**14 275,00**		**4 920,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP03-IA2.3-CARE	0,00		1 000,00	Laboratory consumables	1 400,00	Closing meeting	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		5 700,00	Annual meeting Training parasitology Training ARM Training bacteriology	4 920,00	Y3 meeting 2 Uppsala, Sweden
JIP05-IA2.1-MATRIX	0,00		5 658,00	Adobe Connect license Open access publication	2 175,00	FIFTH full consortium meeting, Spring 2022, location TBA, 1.5 days of work, 2 nights, 2.5 subsistence days (traveling the night before, coming home the evening of the 2nd meeting day)	0,00	
WP4-JIPs management	0,00		7 701,00	License Adobe Connect Lisam license, DMP software Lisam license, DMP software, 10 consultion hours	5 000,00	meeting	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
JIP06-COVID19-COVRIN	0,00		7 248,00	NGS-investigations Screening of Domestic and companion animals for CoV Screening of wild life for CoV Patological investigations Risk assessment and surveillance (sampling)	0,00		0,00	
WP7	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP7-Sustainability	0,00		0,00		1 000,00	various meetings	0,00	
P42-NMVRVI	**0,00**		**0,00**		**1 600,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
P43-ISCIII	**0,00**		**0,00**		**3 000,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
WP4	**0,00**		**0,00**		**1 400,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		0,00		1 400,00	Closing meeting	0,00	
P44-BIOR	**0,00**		**1 500,00**		**7 350,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
WP4	**0,00**		**1 500,00**		**5 750,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		1 500,00	Materials for PT	700,00	Joint meeting with Harmony	0,00	
JIP04-IA2.2-OH-HARMONY CAP	0,00		0,00		4 200,00	Workshop Joint meeting with CARE Practical workshop	0,00	
JIP06-COVID19-COVRIN	0,00		0,00		850,00	Final off-meeting	0,00	
P45-RUOKA	**0,00**		**1 500,00**		**5 000,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
WP4	**0,00**		**1 500,00**		**3 400,00**		**0,00**	
JIP03-IA2.3-CARE	0,00		0,00		2 800,00	Closing Meeting	0,00	
JIP05-IA2.1-MATRIX	0,00		1 500,00	Publication fees	600,00	Meeting 2	0,00	
P46-THL	**0,00**		**0,00**		**1 600,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	

Organisation	Equipment costs	Justification	Other goods and services costs	Justification	Travel and subsistence costs	Justification	Meeting organisation costs	Justification
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
P47-NEBIH	**0,00**		**0,00**		**1 600,00**		**0,00**	
WP1	**0,00**		**0,00**		**1 000,00**		**0,00**	
WP1-Coordination	0,00		0,00		1 000,00	Governing meetings	0,00	
WP3	**0,00**		**0,00**		**600,00**		**0,00**	
ASM T&S-2022	0,00		0,00		600,00	1 FOC delegate	0,00	
TOTAL	**12 013,00**		**1 289 022,00**		**686 794,00**		**331 934,00**	