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VetBioNet - Periodic Technical Report Part B (M36) - Public Summary

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1. Summary for publication

1.1. Summary of the context and overall objectives of the project

VetBioNet seeks to strengthen the European capacity and competence to meet the challenges of emerging infectious disease outbreaks by establishing a comprehensive network of European BSL3 infrastructures, academic institutes, industries and international organisations.

To reach this overall objective, the Activities of VetBioNet are dedicated to:

- Opening the VetBioNet infrastructure resources to external users by providing Transnational Access (TNA) to BSL3 animal experimental facilities and laboratories, technological platforms, and sample collections.
- New scientific and technological developments.
- Enhanced preparedness of the major European BSL3 research infrastructures that will allow a swift response to (re-)emerging epizootic and zoonotic threats.
- Harmonization of Best Practices and a larger use of global standards in European BSL3 infrastructures.
- Determining the social impact deriving from VetBioNet activities.
- Establishing a sustainability plan that will allow VetBioNet to offer its services beyond the project duration.
- Providing improved scientific and technological standards for the services offered by the VetBioNet infrastructures.

1.2. Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

The TNA access-point (TNAAP) and the web-based interface of VetBioNet have enabled easy access for the research community to the offered services. A total of 43 requests (26 in the 2nd reporting period only) have been submitted and contacts have been facilitated between users and the TNA providers. 20 projects (18 in the reporting period) have been accepted after review by the User Selection Panel and the VetBioNet Executive Committee (ExCom).

The “Veterinary Emerging Threat Response Group” (VETRG) has been set up as a consultation group to deliberate on the project’s means to respond to imminent and/or predictable emerging infectious disease threats. An internal call for projects related to African swine fever and zoonotic flavivirus infections has been launched in November 2019 (using a €200.000 Emergency Fund withheld for urgent and/or priority research responses).

The use of a 'VetBioNet' area on the International Veterinary Biosafety Work Group (IVBW) website has allowed widespread dissemination of project outputs regarding Best Practices. This includes outputs from a workshop on “Best Practice for facility management including emergency response and planning” and “Guidelines of minimum requirements and criteria for training provision and competency assessment”. Draft guidelines have been produced on “Designing and upgrading BSL3/3+facilities for farmed animal species”. A workshop was held to debate biosafety standards for post-mortem rooms using a bow tie risk assessment methodology.

The consortium’s work on ethical and social aspects of VetBioNet has led to a “Transparency and Stakeholder Engagement Strategy” paper, “Good practice for Animal Welfare and Ethics Committees” guidelines as well as 12 resources and tools related to the 3Rs, ethics and European regulations.

For the VetBioNet website 72.035 unique visitors and 409.457 page clicks were recorded. Two short videos presenting VetBioNet topics available on YouTube had a total of 402 call-ups. The VetBioNet Training Event “3Rs and Experimental Design” was organized and attended by 45 participants from 8 countries. A database was created to share data generated by the project and made available on February 2020.

The sustainability board discussed mechanisms by which VetBioNet sustainability may be achieved including the pros and cons of an ESFRI application or a third round of infrastructure (IFRAIA) project funding through Horizon Europe. A draft prototype structure focusing on follow-on funding was decided upon and the report delivered.

Progress has been made in the standardization of a sheep infection model for PPRV; the development of an Alpaca model for MERS-CoV; the improvement of a ferret aerosol sampling/infection model to study influenza infection; and the optimisation of salmonid and cyprinid models for studying relevant fish viruses (SCVS, IPNV, VHSV and IHNV). Milestones have been achieved regarding the development of novel alternative in vitro/ex vivo models including: i) an in ovo model to predict NDV strain pathogenicity; ii) the use of chicken B cells for IBDV pathotype characterisation and iii) protocols for the preparation and culture of avian endothelial cells (susceptible to a variety of avian pathogens), chicken and bovine precision-cut lung slices, pig and rabbit MSCs, and porcine nasal mucosa explants and their use in pathogen infection studies.

Transcriptomics and deep-sequencing approaches to elucidate the host immune responses of livestock, as well as characterising the viral characteristics within the infected host have been undertaken. High-throughput targeted transcriptomic platforms have been developed and validated to explore the host cell responses to infection, as well as diagnostic assays to help speed up pathogen and infection recognition in rabbits and salmonids.

Partners have collaborated to develop novel approaches to behavioural and physiological monitoring of experimentally infected animals and to discriminate individual data for group-housed animals. This provides scientific and welfare parameters per model. Ex vivo/ in vitro bioimaging is modelled using relevant models and molecular tags. For the development of in vivo imaging, access to bioimaging equipment within high containment facilities is being implemented.

1.3. Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

VetBioNet TNA activities consist in providing free-of-charge access to BSL3 facilities and technical resources of the consortium. The call is permanent and project proposals are promptly handled by the VetBioNet TNAAP. Joint Research Activities (JRAs) aim at improving the scientific and technical standards of the services provided by the consortium’s infrastructures. Some JRAs will develop and optimise livestock infection models for a number of high-impact epizootic and zoonotic diseases. Other JRAs will advance the state-of-the-art of the current analytical, telemetric or bioimaging approaches in animal infectious disease research. Five private partners are directly involved in the VetBioNet JRAs, thus permitting technologic development at an advanced Technology Readiness Level and potentially commercialisation of project outputs. Collectively, VetBioNet TNA and JRAs will help to increase the competitiveness of the participating infrastructures and to advance the European research and R&D agenda related to epizootic and zoonotic diseases.

The overall goal of the Networking Activities (NAs) is to foster the cooperation between the consortium partners and forge cooperative relationships with other European or international research initiatives, industrial stakeholders, international organizations and policy makers. A Preparedness Plan has been implemented to establish VetBioNet as a central player in the European emergency response to infectious diseases. Concerted action by the “Veterinary Emerging Threat Response Group” (VETRG) is crucial to warrant a swift and efficient response of the consortium. VetBioNet NAs addressing Best Practices and the harmonisation of protocols will help advancing the biosafety standards in high-containment facilities and may inform EU guidelines and regulations. NAs aiming to ensure high ethical standards and clarify the social impact of VetBioNet activities provide an ambitious and unique approach to map and positively alter the public perception of animal infectious disease research.