VetBioNet - Periodic Technical Report Part B (M18) - 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.
VetBioNet is dedicated to advance research on epizootic and zoonotic diseases and to promote related technological developments.
To reach this overall objective, the Integrating Activities of the VetBioNet partners are dedicated to:

- Opening the VetBioNet infrastructure resources to external users by providing Transnational Access 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

A VetBioNet website has been created and is operational since May 2017. During the period, the website had 48.852 unique visitors with 267.872 pages visited. A project communication package including logos, posters, leaflets and presentation templates was made available to all partners. Moreover, two short videos targeting veterinary laboratories and the general public were published on YouTube.

A web-based interface to submit and manage transnational access (TNA) services has been launched in M11 of the project. Within 8 months' time, 18 applications have been received and evaluated by a dedicated User Selection Panel (USP), consisting of independent and highly experienced scientists from various scientific disciplines related to epizootic and zoonotic diseases. A specifically established TNA access point warrants a centralized application and management platform (One-Stop-Shop) as interface between users and service providers. The VetBioNet internet site, social media, presentations or information stands at nationals/international meetings were used as means to brief the European and international research community on the opportunities, modalities and conditions of TNA services provided by VetBioNet.

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 epizootic and zoonotic infectious disease threats at European level (Preparedness plan). Links with European/international networks and organisations and industrial stakeholders operating in relevant fields have been forged.

Considerable progress has been made in the harmonisation of best practices for operating facilities by defining practices and protocols for experiments done in BSL3 facilities on the basis of international standards. This VetBioNet topic now occupies a dedicated area on the International Veterinary Biosafety Workgroup (IVBW) website for displaying project outputs and promoting exchanges with the scientific community. Workshops have been held on the CEN CWA 15793 standard (a CEN Workshop Agreement document on biorisk management) and the steps needed to be compliant with this standard by VetBioNet partners.

The first version of the Transparency and Stakeholder Engagement Strategy, and resources related to specific ethical issues, 3Rs resources and tools, as well as training resources and events (Summer Schools, Training Events) have been developed. A number of the building blocks for the upcoming Deliverables are in place and a notable increase in project outputs will be seen during the second reporting period of the project.

Engagement with current and future potential stakeholders and identification of funding opportunities is an essential part of investigating mechanisms to sustain VetBioNet activities and tools beyond the current term of funding, which ends in 2022. Workshops have been organized to share the expertise of VetBioNet partners and related international organizations in the domains of biocontainment and preparedness to emerging infectious diseases. VetBioNet organised a Stakeholder Meeting in Brussels in November 2017 where stakeholders were consulted on their interest in VetBioNet activities; a report is available on the VetBioNet website.

Joint Research Activities of the project partners have been dedicated to: (i) the standardization of an ovine infection model for Peste des petits ruminants virus (PPRV); (ii) the development of a reservoir pathogen model in Alpaca for Middle East respiratory syndrome coronavirus (MERS-CoV); (iii) the improvement of ferret aerosol infection models to study airborne Influenza virus infections through the use of adequate aerosolizers and air-samplers; (iv) the optimisation of salmonid and cyprinid models for the study of relevant fish viruses (SCVS, IPNV, VHSV, IHNV). Considerable progress has been made in the the development of novel alternative *in vitro* models : (i) testing of an *in ovo* (embryonated chicken egg) infection model to predict the pathogenicity of Newcastle Disease virus (NDV) strains; (ii) development of a chicken B cell culture infection model for Infectious Bursal Disease virus (IBDV); (iii) development of robust protocols for the preparation of avian endothelial cells (susceptible to various avian pathogens), avian and bovine precision-cut lung slices, porcine nasal mucosa explants and pig and rabbit mesenchymal stem cells (MSCs).

Tools to analyse high risk infections are being developed. Analyses of the bovine and avian transcriptomes have been initiated using 2 state-of-the art platforms (Nanostring, Fluidigm). Ovine MHC I and II sequencing platforms are being developed, along with porcine B-cell and T-cell receptor analysis pipelines. Approaches to virus deep-sequencing (Foot-and-Mouth-Disease virus) as well as host microbiome (porcine) have been developed and applied to animal models. Development of reagents central to enable construction of RHDV serotyping ELISAS, as well as ELISAS to track salmonid viral infections have been progressing successfully.

Instrumentation and software for surveying relevant (patho)physiological parameters are being developed. As a preparatory step, a questionnaire was set out among partners to prioritize parameters to be measured and monitored and technical conditions to take into account (numbers of animals per group, type of housing). Sample decontamination issues are effectually addressed by the work on harmonization of decontamination practices and biocides.

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 Trans-National Access activities consist mainly in providing free-of-charge access to the BSL3 facilities and technical resources of the consortium. Access is provided to researchers or private enterprises proposing a sound scientific project related to epizootic and zoonotic diseases through an online TNA portal (http://www.vetbionet.eu/calls/). The call is permanent and project proposals are promptly handled by the VetBioNet TNA access point (TNA-AP), thus allowing the conception, submission and realisation of TNA projects within a minimal time frame. As part of its TNA portfolio, VetBioNet also offers access to sample collections and the generation of on-demand samples. Joint Research Activities (JRAs) by the project partners concern the development or optimisation of livestock infection models for a number of high-impact epizootic and zoonotic diseases. Additional JRAs are specifically dedicated to 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. Most importantly, the ongoing or future JRAs will improve the scientific and technical standards of the services provided by the consortium's infrastructures. Collectively, the VetBioNet TNA activities and JRAs will help to increase the competiveness 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 VetBioNet 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. As part of this strategy, Stakeholder Meetings are organized to collect external feedback on the project objectives and outputs and to reach out to networks with similar or complementary interests. A Preparedness Plan, with the Veterinary Emerging Threat Response Group (VETRG) as its central instrument, has been implemented to enhance the preparedness of the VetBioNet BSL3 infrastructures to respond to (re-)emerging epizootic/zoonotic disease threats and to establish VetBioNet as a central player in the European emergency response to infectious diseases. Concerted action by the VETRG is crucial to warrant a swift and efficient response of the consortium, especially at the present time when the EU is threatened by high-impact epizootic and/or zoonotic diseases such as African swine fever and West Nile fever. VetBioNet NAs addressing Best Practices and the harmonisation of protocols (in concertation with international stakeholders) will help advancing the biosafety standards in European 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.

The ultimate goal is to firmly establish VetBioNet as an eminent infrastructure network with outstanding expertise in animal infectious disease research providing state-of-the-art services to the European scientific community, which shall be sustained beyond the project's life.