



## **Executive Summary EPIZONE year 4**

During recent years the risk of introduction of new infectious agents into the EU or spread within the EU has increased due to the increasing number of people and animal movements across EU member states. In addition global warming is likely to enhance the risk of spreading of arthropod borne diseases such as Bluetongue, African Horse Sickness, Crimean Congo haemorrhagic fever and West Nile Fever. Despite extensive control measures, over the last few years several new epizootics have occurred, including the introduction of BTV into Europe, the threat of Peste de Petit Ruminants from Morocco, and the introduction of New Influenza into Europe from Mexico. Innovative and rapid control strategies will be needed to combat these new epizootic disease outbreaks. EPIZONE aims to apply its integrated research activities to more rapidly develop new cost-effective prevention and control strategies, which will help to effectively combat such epizootic diseases and reduce the social impact and costs implicated.

### Mission and objectives

The mission of our Network of Excellence: EPIZONE is to develop a network of excellence to improve research on preparedness, prevention, detection, and control of epizootic diseases within Europe to reduce the economic and social impact of future outbreaks of Foot-and-mouth disease, Classical swine fever, Avian influenza, and other relevant epizootic diseases like Bluetongue and African swine fever, through increased excellence by collaboration.

This mission can be divided into four main objectives:

- To establish joint scientific integration activities encompassing research on four themed areas, Diagnostics, Intervention Strategies, Surveillance and Epidemiology, and Risk Assessment related to preparedness, prevention, detection, and control of epizootic diseases.
- To develop and implement Strategic Integration activities for establishment of international priorities in scientific activities, strategic review and planning in themed areas.
- To establish Spreading of Excellence between partner institutes and beyond in order to ensure optimal use of scientific resources, expertises, skills, and specific knowledge of (improved or new) methods and of (new or re-) emerging diseases.
- To develop and establish a sustainable and democratic management structure based on a "Virtual Institute" with clear rules, written processes and procedures including mechanisms for review and assessment, and appropriate administrative support as defined by a Consortium Agreement.

### Global dimension

The activities of EPIZONE are based around a "Virtual Institute" concept. The "Institute" comprises 17 institutes of veterinary science, health and agronomy, the Food and Agriculture Organisation (FAO) and 1 Small and Medium Enterprises (SME) from 12 countries (Fig. 1), including over 300 acknowledged experts in animal diseases. Inclusion of China, Turkey, the Food and Agriculture Organisation (FAO), and several partners with an excellent network outside the European Union (EU) ensure a global dimension. The partnership is supported by a legal Consortium Agreement.

	NETHERLANDS	Central Veterinary Institute of Wageningen UR Lelystad, The Netherlands	(CVI)
	GERMANY	Friedrich-Loeffler-Institute,	(FLI)
	UNITED KINGDOM	Institute for Animal Health,	(IAH)
	UNITED KINGDOM	Veterinary Laboratories Agency,	(VLA)
	FRANCE	Agence Française de Sécurité Sanitaire des Aliments,	(AFSSA)
	DENMARK	National Veterinary Institute, Technical University of Denmark	(DTU VET)
	SWEDEN	Statens Veterinärmedicinska Anstalt,	(SVA)
	FRANCE	Centre de coopération Internationale en Recherche Agronomique pour le Développement,	(CIRAD)
	SPAIN	Center of Animal Health, National Institute for Agriculture and Food Research and Technology,	(CISA-INIA)
	ITALY	Istituto Zooprofilattico Sperimentale delle Venezie,	(IZS-Ve)
	CHINA	Lanzhou Veterinary Research Institute,	(LVRI)
	POLAND	National Veterinary Research Institute,	(NVRI)
	TURKEY	FMD Institute Ankara,	(SAP)
	BELGIUM	Veterinary and Agrochemical Research centre, VAR-CODA-CERVA,	(VAR)
	GERMANY	Hannover Veterinary School,	(HVS)
	ITALY	Istituto Zooprofilattico Sperimentale della Lombardia e dell' Emilia Romagna Brescia,	(IZSLER)
	CHINA	Harbin Veterinary Research Institute,	(HVRI)
	ITALY	Food and Agriculture Organization,	(FAO)
	NETHERLANDS	Digital Value,	(DiVa)

<p><b>Coördinator:</b> Professor Wim van der Poel Tel.: + 31 320 23 83 83 E-mail: epizone.cvi@wur.nl</p>	<p><b>Deputy coördinator:</b> Johan H. Bongers, DVM Tel.: + 31 320 23 86 07 E-mail: epizone.cvi@wur.nl</p>
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<p>Contact information: Jitty Oosterga-Land DVM Tel.: + 31 320 23 88 83 E-mail: epizone.cvi@wur.nl</p>
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[www.epizone-eu.net](http://www.epizone-eu.net)



Figure 1 Involved contractors and coordinator contact details

### Organisational structure

The organisational structure of EPIZONE (Fig. 2) comprises a matrix design of joint activities in non-scientific themes 1, 2, and 3, and in scientific themes 4, 5, 6, and 7. Each theme contains a number of work packages and is led by a theme leader assisted by a deputy theme leader, all members of the Executive Committee. The work packages within each theme are led by a work package leader. Additionally, the internal call projects running one year are placed under a corresponding theme. They are led by an internal call leader.

Governance is placed under a Coordinating Forum comprising representatives of all EPIZONE partners. They are supported by the administration bureau, responsible for both the administrative and financial obligations and the Management Advisory Board, five democratically elected representatives at director level from all partners. Scientific advice to network activities is provided by an External Advisory Panel comprising five international senior external

scientists, including a representative of the OIE (World Organisation for Animal Health).

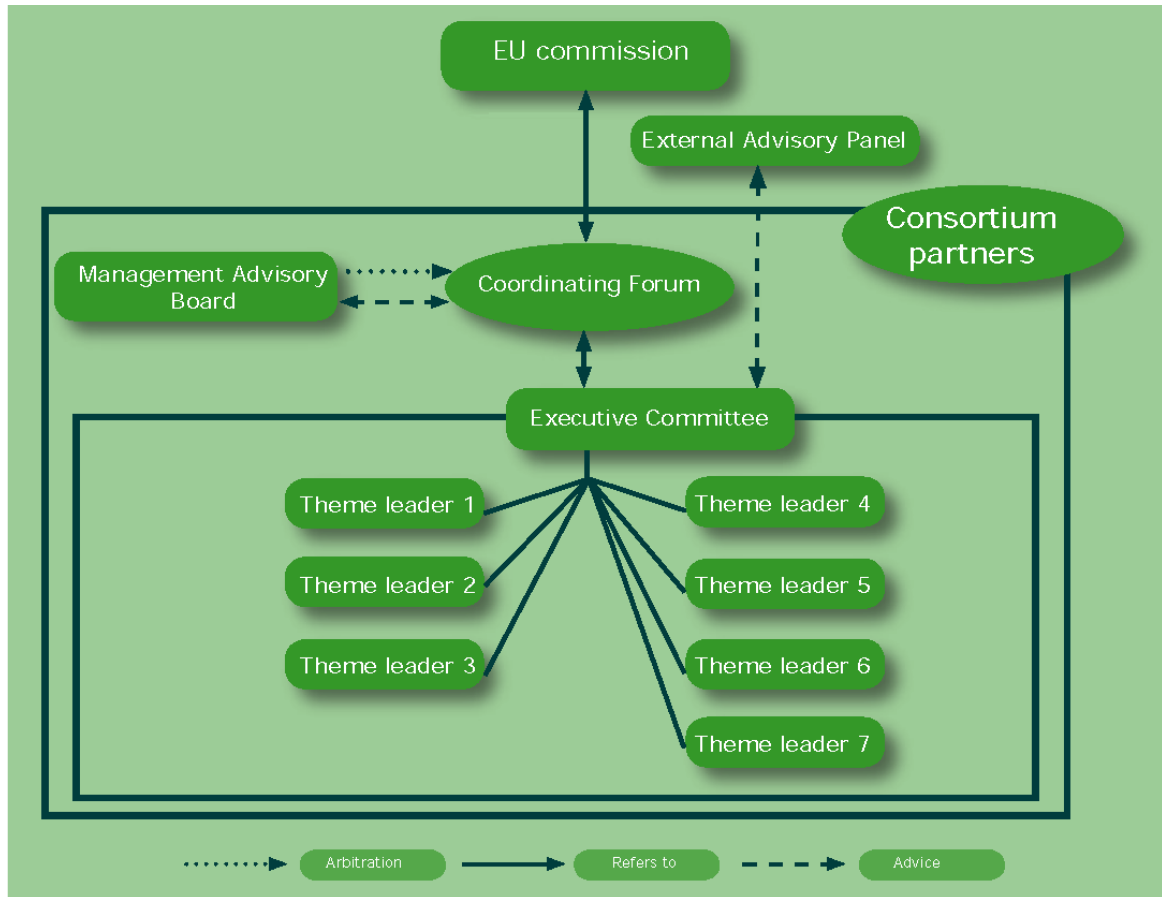


Figure 2 Organisational structure of EPIZONE

Led by the coordinators representative, **Theme 1 Structure and Management** focuses on the development and implementation of structured administrative and financial management of the network in WP1.1, "Virtual Institute", and in communication in WP1.2. During the Fourth year of the network, again a hard closure of the financial budgets was conducted to ensure the use of unspent budgets in the final year of the network. The joint funds in WP1.1 were used to finance the activities of the EPIZONE database coordinator who was appointed in the beginning of 2010. Another part of this budget was used for an interactive session on "major epidemic threats" during the 4<sup>th</sup> annual meeting. Several WP, committee and board meetings continue to be very important for EPIZONE and were therefore facilitated at the m42 meeting in Lelystad and the 4<sup>th</sup> annual meeting. Options for a sustainable structure for the network beyond the EU funded period were explored and a draft discussion document was produced. The newsletter "EPIZONE update" was regularly published for internal and external use and has improved the exposure of EPIZONE for its participants but also for its stakeholders and interested parties outside the network. Moreover EPIZONE was presented at several international scientific conferences.

Effective and strategic integration of scientific research activities of EPIZONE is covered by **Theme 2 Strategic Integration**. To obtain a realistic impression of the current status on the integration of EPIZONE research activities a



questionnaire on integration was launched for all participants in the network and had a good response of >50%. The results were presented in the CF and made available at the website. In general, the respondents were positive about the scientific integration and seemed confident that this can be sustained. The EPIZONE 4<sup>th</sup> annual meeting was even more successful than the previous one, with more attendees and more scientific presentations and networking opportunities. Contacts with related (EU) projects were again facilitated during this meeting at which 9 such projects presented themselves, including GLaD from the WHO. The industry was well presented with 9 sponsors. To integrate existing knowledge on collections of samples and laboratory materials and to make such resources accessible to partners, additional inventories were made and more data were stored in databases and made available to partners through the website. The option of a bioinformatics portal with special attention to free software was explored. For better integration of EPIZONE databases a database coordinator was appointed whose main task will be to make all databases within the network accessible and integrate these databases as much as possible.

**Theme 3** is responsible for **spreading excellence** within and outside the network. Training and workshop activities were continued in year 4 by the organisation of 3 workshops on (1) "Training Course in Science Communication" in Denmark, October 2009, (2) "Design and analysis transmission experiments" in The Netherlands, November 2009 and (3) "Laboratory contingency planning and laboratory exercise" in Italy, March 2010. The sustained success of the short-term training missions was confirmed in year 4 with eight applications sponsored for 8 EPIZONE members. The average duration of these trainings were 2.13 weeks. E-distance learning programmes were launched for 18 persons on "Investigation on spatial patterns of animal diseases" and 3 persons were supported for a laboratory-based training over 2 weeks at IAH Pirbright (2 FMD and 1 BT courses). Young EPIZONE has grown in the second year to an impressive 170 participants, with their own newsletter and annual meeting. Within their network, funding for the annual meeting, the theme 5 meeting and workshops are organised. Each year the participation in the annual meeting is sponsored by Young EPIZONE for a number of PhD students facilitating their active participation in the EPIZONE network.

In **Theme 4 Diagnostics** the networking and the collaboration within each work package (WP), but also between the different WPs, was further improved and enhanced. The validated and harmonized diagnostic techniques (real-time PCR, DNA-chip, DIVA ELISA, genetic DIVA PCRs, and molecular pen-site tests) as well as the growing collection of "EPIZONE RNA/DNA reference panels" (e.g. for CSFV, AIV, FMDV, NDV, AHSV) and reference protocols, are extensively used within Theme 4, but interestingly more and more also in WPs of other Themes. Several ring trials for different epizootic diseases were successfully conducted (e.g. AIV, AHSV, ASFV), the planning of a microarray ring trial is finished, and joint publications about DIVA tests are submitted or in press. The EPIZONE chip data can now be easily analysed using a web server based software, and the dedicated chips for selected diseases are further validated and transferred to other laboratories. For effective selection and standardization of pen-side testing, the group has focussed on selected methods like LFD, commercial late PCR detection devices and LAMP. First concerted field trials have been started, and as a result of the activities, a project for further validating and testing LAMP assays (for pen-site diagnostics in developing countries) will be funded by the OIE. Finally, the "internal call" work package 4.5 about KHV-serology has been fully integrated into Theme 4. First results about test development in fish were presented. During the 4<sup>th</sup> Coordination and progress meeting of Theme 4 in St. Malo the high quality presentations of all work packages with impressive results, and a very



broad involvement of different EPIZONE partners, convincingly demonstrated the further success of Theme 4.

Participants from **Theme 5 Intervention Strategies** met for networking activities at the EPIZONE Annual Meeting in Antalya May 2009 and at the Theme 5 Meeting in Paris October 2009. The latter was attended by 55 participants including 15 members of Young EPIZONE. These meetings provided the opportunity to present scientific work, hear about new scientific advances, arrange collaborations and discuss joint programmes of work. A survey was carried out after the meeting and the results confirmed that the most valued outputs from these meetings were the opportunities to exchange knowledge and expertise and arrange collaborations.

The working group on ASFV carried out joint experiments funded by an Internal Call (WP 5.6) to test different prime boost strategies for delivery of candidate protective antigens. These experiments also provided samples for measuring immune and acute phase protein responses as well as for validation of diagnostic tests. The working group on RVFV have been awarded an Internal Call (WP5.7) project to establish a network for RVFV. This network has met to identify gaps in knowledge and reagents and will work to standardise animal challenge models and diagnostic tests. Groups working on BTV and AHSV have collaborated on sharing access to a mouse model for BTV and AHSV and also on testing induction of protective responses induced by recombinant MVA expressing individual genes. Collaborations have continued on testing different delivery methods for siRNAs in vitro and in vivo, including the Bacmam technology. Testing of different antivirals, including small molecule inhibitors, peptides and siRNAs targeted at a number of viruses has continued. Proof of concept has been achieved for an antiviral which was demonstrated to reduce CSFV replication in vivo.

During this reporting period more than 20 publications in refereed Journals have been published which all cite EPIZONE funding.

The aim of **Theme 6 Surveillance and epidemiology** was to harmonise, standardise, improve, and develop efficient surveillance programmes as well as optimised methods to investigate the epidemiology of epizootic diseases. In WP6.1 progress was made on surveillance and epidemiology of several fish diseases. A major achievement was made by generating quantitative data on the notifiable diseases VHS and IHN and including these in a geographic information system (GIS) as a tool for epidemiological analysis. Geographic coordinates of all fish farms have thus far been obtained from Denmark, Sweden, Poland, Italy and in part from Germany. In WP6.2 the main achievements during this reporting period were a continued sequencing of avian influenza (AI) virus genomes and submission to the GISAID database. Sequencing was also done for APMV by the WP partners and to date, 662 separate AI and APMV gene sequences have been generated and/or submitted to GISAID. Finally a sequencing ring trial for APMVs was carried out among the partners in the WP. In 'Experimental epidemiology' WP6.3, the most important event conducted during the reporting period was the course 'Design and analysis of transmission experiments' that was initiated from within the WP and that was open to all members of EPIZONE. This course was an excellent example of effective knowledge dissemination within and beyond the consortium. Twenty five participants attended the course, 23 of whom were from within the EPIZONE network (CVI, DTU-Vet, FLI, IAH, IZSLER, IZS-Ve, VAR, and VLA). In year 4 analyses of FMDV experiments continued and the analysis of SVDV experiments was initiated. A bio security questionnaire to be used in pig farms in areas with SVDV outbreaks was distributed and completed. In the 'BT-DYNVECT' project (IC6.7) data related to the outbreaks and to culicoides of BTV-8 in North Western Europe was collected and shared among partners. This resulted in a FTP-Server (<ftp://ftp.fli.bund.de/BT-EPIZONE>), implemented by the Friedrich-



Loeffler-Institut (FLI) where all data were stored and made accessible to the partners in the WP.

**Theme 7 Risk Assessment** focussed on the collection of data for risk assessments, through the collaboration provided by the EPIZONE network. In WP7.2, an online database on epizootic diseases was implemented and is now ready for use. Gaining access to data for inclusion into the database, particularly historical data, was and continues to be challenging. To overcome this problem, a detailed description of the database has been prepared for decision-makers who could provide the required data (in partner countries) and face-to-face meetings with decision-makers are planned for JPA5. The main objective of WP7.3 has been the development of a decision support system for classical swine fever. The system has used data from several partner countries and a number of screens have been translated into different languages. Also, the sensitivity of the system has been tested using experimental data. The data collected for WP7.4 cover two main areas: qualitative spatial data for CCHFV for use within a GIS risk assessment and data relating to the potential use of genomic data for risk assessments related to vector-borne diseases. Changes in risk as a result of climate change have been a central theme of this WP and the data gathered have been collected bearing this in mind. In addition to these 3 WPs, an interactive expert elicitation exercise was planned by a group from Theme 7 and was run at the 4<sup>th</sup> annual meeting to gather the opinions of experts and scientists with related expertise, on the future epidemic threats to the EU. The data collected will be analysed during JPA5 and this analysis will include a stratification of opinions by experts' region, area of expertise and length of time working in their particular area of expertise. Overall, this theme has resulted in a vast amount of data being gathered and during JPA5; these data will be used within novel risk assessment applications. Although risk assessment continues to be a small part of the EPIZONE Network of Excellence, interest in the topic has increased over the last 4 years; there was significant increase in the number of risk assessment abstracts submitted for the 4<sup>th</sup> annual meeting and over 200 delegates participated in the interactive session, which received positive feedback. Interaction with other Themes was also improved, with a joint Risk Assessment (Theme 7) and Epidemiology (Theme 6) workshop being held.