

## ANNOUNCEMENT

### COORDINATION OF EUROPEAN RESEARCH ON EMERGING AND MAJOR INFECTIOUS DISEASES OF LIVESTOCK (EMIDA ERA-Net)

#### TRANSNATIONAL CALL FOR PROPOSALS

The 2<sup>nd</sup> joint call for transnational research projects of the EMIDA ERA-Net initiative will open on March 7<sup>th</sup>, 2011 with a total budget in the region of €20 million.

This announcement will provide you with the relevant information on call topics, project eligibility criteria, timeline, application procedure, forms, guidelines, etc. and a detailed description of the activity lines and specific topics.

#### Call Topics

The 2<sup>nd</sup> joint call for transnational research projects of EMIDA includes the following 8 activity lines with several specific topics each.

##### **A. Ecology and animal health – diseases transmitted by arthropods**

Insect and tick borne diseases constitute a complex and diverse risk to animals and humans in a changing European setting. Collaborative proposals are invited that aim to optimize prevention and control through cost efficient surveillance, diagnostics, vaccines, and disease modelling including estimation of important epidemiological and entomological parameters.

##### **B. Ecology and animal health – wildlife reservoirs**

As wildlife may be a reservoir of several infectious pathogens for production animals and/or humans, there is a need to increase knowledge on the relevance and the risk of wildlife-borne diseases (including zoonoses) in Europe.

##### **C. Zoonoses**

Underpinning knowledge and tools for early warning, prevention and control strategies against (re-) emerging zoonotic infectious diseases are needed.

##### **D. Antimicrobials and anthelmintics: resistance and alternatives for use**

The abundant use of antimicrobials in livestock has the side effect of causing emergence and spread of resistance in pathogens, with serious consequences for animal and human health control. Need of increased knowledge is perceived in the fields of early warning systems, of risk factors assessment, of intervention options, and of development of alternative use medications. Herd management tools are also to be developed.

Activity lines address broader research areas while the associated topics particularly focus on more specific research needs. Funders may ask for proposals on the level of activity lines and/or specific topics.\* Project consortia are invited to apply accordingly. Each subject will be funded by different combinations of countries (funders), according to a distributed pot scheme. (Please refer to ANNEX for detailed descriptions.)

*\* Please note: If a country is supporting a particular activity line that addresses a broader research area, the country could also be interested in supporting specific topics associated with that activity line even though the country's name is not listed in the specific topic section. In such a situation, applicants should first contact their National Contact Point (see page 29, National Contacts) to establish their interest in funding a particular specific topic.*

##### **E. Production diseases – disease susceptibility**

Many animal conditions, although not related to highly contagious and epidemic diseases, seriously affect livestock and related farm production. There's a need to investigate evident or clinically latent syndromes with respect to the host, its genetic and immunological profile and pathogens patterns. Environmental and economic factors are also to be considered.

##### **F. Production diseases – epidemiology, diagnostics and vaccination**

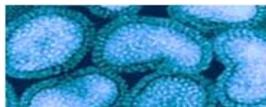
Research is required to improve our understanding of production disease epidemiology, both between and within herds, and to generate the necessary underpinning knowledge relating to the development of improved control tools, including diagnostic tests and vaccines, and their implementation.

##### **G. Diseases in aquaculture**

Underpinning knowledge and technological advances are required to aid the development of appropriate approaches to the early warning, prevention, spreading, control and eradication of infectious diseases in aquaculture.

##### **H. Epizootic diseases**

There is a need for development of improved control tools including diagnostic tests as well as knowledge about disease dynamics and pathogenesis of epizootic diseases.



### PROJECT ELIGIBILITY CRITERIA

In order to increase the capacity of European animal health science and research and to enhance the coordination and collaboration of pan-European research activities in this field, funding opportunities will be offered to excellent and innovative transnational R&D projects.

- The maximum project duration is three years.
- Project consortia must involve a minimum of three (3) and a maximum of ten (10) partners from three (3) different (participating) countries. Consortia members from non-participating countries are welcome, but will have to fund their contribution to the research project themselves.
- In case of doubt, potential project consortia partners are advised to contact their National Contact Points (refer to ANNEX) to confirm whether national funding is available for any particular activity line or subtopic before agreeing to participate. National call documents are legally binding.
- Proposals coming forward with support (financial or in kind) from industry or other non-EMIDA funding bodies are encouraged.

### TIMELINE

The deadline for submitting pre-proposals is **May 3<sup>rd</sup>, 2011, 1p.m. (CET)**.

Invitations for full proposals will be sent to project coordinators by the **end of June 2011**.

The deadline for submitting full proposals will be **September 7<sup>th</sup>, 2011, 1p.m. (CET)**.

The funding decisions are expected to be announced in **December 2011**.

### FORMS AND GUIDELINES

Forms and guidelines will be available after March 7<sup>th</sup>, 2011 on **www.submission-emida-era.net**.

### APPLICATION PROCEDURE

**Applications will involve a two-step submission procedure with a pre-proposal and a full proposal.** All proposals must be submitted electronically to the **EMIDA ERA-Net call office**

(**www.submission-emida-era.net**) as the central communication point.

**Pre-proposals** will be checked by the partners from each of the countries involved to ensure, that they comply with the national **eligibility criteria**, to be published in the **EMIDA ERA-Net 2<sup>nd</sup> call guidelines** ([www.submission-emida-era.net](http://www.submission-emida-era.net)). **The project description may not exceed three (3) pages in total: a two (2) pages project description plus a one (1) page project summary.**

EMIDA ERA-Net will check the submitted pre-proposals for relevance to the call and for formal EMIDA ERA-Net eligibility criteria (see guidelines for applicants on [www.submission-emida-era.net](http://www.submission-emida-era.net)). The EMIDA ERA-Net funders will hold a pre-selection meeting in order to decide, which consortia will be invited to submit full proposals.

**Full proposals** will be peer reviewed by an international expert panel that is different for each of the 8 activity lines.

### CONTACTS

Please do not hesitate to contact the EMIDA ERA-Net call office or your national contact points (see ANNEX) if you need support. We will be pleased to assist you. Proposals must be submitted at **www.submission-emida-era.net**.

EMIDA ERA-Net **contacts:**

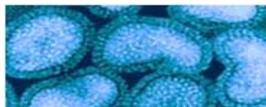
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**EMIDA** is concerned with the development of a durable focused network of national research funders in Member and Associated States of the EU for the purpose of sharing information, coordinating activities and working towards a common research agenda and mutual research funding activities in the field of animal health. For more information or to receive regular information, please visit [www.emida-era.net](http://www.emida-era.net) and subscribe to our newsletter.



The EMIDA ERA-NET is funded by the European Commission's Seventh Framework Programme. Contract No. 219235



## ANNEX: DETAILED DESCRIPTIONS OF TOPICS

Activity lines address broader research areas while subtopics particularly focus on more specific research. Funders may ask for proposals on the level of activity lines and/or subtopics. Project consortia are invited to apply accordingly.

### **Activity line A: Ecology and animal health – diseases transmitted by arthropods (epidemiology, vector competence, early warning and surveillance systems, diagnostics, vaccines, vaccination strategies)**

Risk assessment, early warning, early identification, surveillance, prevention and control of endemic, re-emerging and emerging arthropod borne diseases require an integrated tool kit of cost efficient diagnostic tests, introduction and spread models, surveillance systems, as well as preventive strategies and control methods.

Research proposals should be aimed at providing knowledge and information that enhances the development of a fully integrated package of diagnostic tests, surveillance systems, risk assessment models, spread models, preventive strategies and control methods for managing important vector borne diseases. Collaborative proposals are invited that address one or more of the following topics:

- sensitive and specific diagnostic tests for surveillance
- risk mapping and early warning models based on trade, travel, environmental, meteorological, vector competence and other parameters
- risk based surveillance systems
- development of operational control methods including new vaccines
- development of spread models able to develop and test prevention and control strategies
- transmission mechanisms (from cell to cell, from tissue to tissue, from vector to host, from host to vector, and from population to population)
- trans-national sharing of the relevant data considering timely identification, communication and response

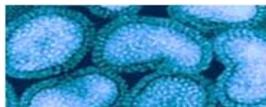
**Activity line A will be funded by:  
BE, CH, DE, DK, ES, FR, GR, NO, SE, UK**

### **A1: Tick borne diseases (Epidemiology, intervention strategies, pathogen characterisation, diagnostics, modelling, surveillance systems)**

Ticks are important vectors and natural reservoirs for bacterial and viral diseases in animals and man. An expansion of tick species into new areas and niches is observed resulting in increased numbers of infections.

Surveillance systems should be developed for ticks and the pathogens they carry. Ticks collected at relevant sites should be identified and assayed for the presence of a variety of bacterial and viral pathogens. Pathogens should be phylogenetically characterized. Epidemiological models and intervention strategies should be developed.

**Specific topic A1 will be funded by:  
DE, DK, ES, IL, IT, NL**



**A2: Vector competence of arthropods in particular for important zoonotic pathogens (infection models with insects, vector mechanisms, transmission studies, risk assessment, West Nile Fever, Rift Valley fever, other arboviruses)**

With changing environments zoonotic arboviruses (AV) occupy new niches. Knowledge of the factors influencing vector competence and capacity of both exotic natural mosquitoes and of indigenous mosquitoes is crucial for risk assessments and control strategies. Proposals should consider one or more of the following:

- AV infection and transmission studies with natural and indigenous mosquito vectors under different environmental conditions
- development of molecular vector typing methods
- molecular studies on factors needed for AV to infect or replicate in mosquitoes
- novel techniques for detection of AV in mosquitoes
- monitoring the general AV prevalence in mosquitoes
- establishing a laboratory network for mosquitoes and their AV infections
- horizontal, vertical and seasonal mosquito distribution maps

**Specific topic A2 will be funded by:  
BE, DE, DK, ES, IL, IT, UK**

**A3: African Horse Sickness (AHS) (vaccination, epidemiology, host virus interaction)**

The existence of an effective diagnostic and early warning system for the detection of possible introduction of African Horse Sickness in Europe coupled with the availability of serotype-specific vaccines are the key elements for any control measure.

Proposals are invited to develop an international network with the aim of:

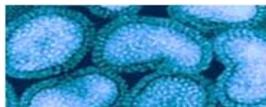
- promoting the use of standardised and comparable diagnostic protocols for African Horse Sickness (AHS), including the development and validation of serological screening tests through the production of monoclonal antibodies
- developing and evaluating new polyvalent inactivated vaccines for the main AHS serotypes
- evaluating the vector competence of *Obsoletus* complex species through experimental infections
- building risk maps for Europe

**Specific topic A3 will be funded by:  
BE, DK, ES, IE**

**Spec. topic A4: Blue Tongue Virus (vaccines, pathogenesis, epidemiology)**

Response to the recent incursions of different bluetongue serotypes, European Countries implemented programs to monitor virus circulation and vector distribution. These activities resulted in collecting and storing of a great variety of *Culicoides*

Proposals are invited to examine these collections by using the new molecular biological tools recently available for detecting bluetongue virus and for identifying *Culicoides* species and to relate the results



climatic and environmental variables , thus producing information on the epidemiology of bluetongue occurring in Europe in the last decade and the role played by climate and the environment

**Specific topic A4 will be funded by:**

**BE, DK, ES, IE, IL**

**A5: Development of cost efficient and reliable surveillance systems for (exotic) arthropod borne diseases (targeted surveillance on time periods, geographical areas (incl. individual farms) and animals of high risk.)**

Globalization combined with climatic and environmental changes may lead to the introduction and spread of a range of exotic arthropod borne diseases in EU member states. Surveillance for numerous potential infective disease organisms may be too expensive to implement for common practice. However, the risk of introduction, spread and establishment of arthropod borne diseases varies in time and space at herd and even animal level. Risk based and targeted surveillance systems may therefore be particular cost efficient for these infections. Proposals should address development of cost efficient and reliable risk based / targeted surveillance systems for (re-)emerging vector borne diseases and focus on general principles and methods applicable in all member states

**Specific topic A5 will be funded by:**

**BE, DE, DK, ES, IE, IL, NL**

**A6: Rapid in-vector multiplex diagnostics for pathogens identification and differentiation (flavivirus rapid testing, multiplex diagnostics, molecular diagnostics, microarrays)**

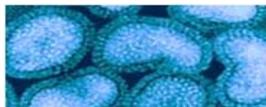
The circulation of different flavivirus in EU necessitates an optimised diagnostic platform able to distinguish them. Virus identification and host species determination represent a key element during the surveillance activities.

Aim of research is to improve knowledge on the species-specific role of vectors and vertebrate hosts in flavivirus epidemiology through the development and validation of a rapid molecular diagnostic platform, to be applied for vector testing, in order to:

- detect and differentiate the circulating flaviviruses through a multiple-target test
- identify the mosquitoes' species through molecular techniques
- identify the host preference of the mosquitoes' species through the identification of the blood meal

**Specific topic A6 will be funded by:**

**BE, CZ, DE, DK, ES, IE, IL, IT**



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**Activity line B: Ecology and animal health – wildlife reservoirs (epidemiology, early warning and surveillance systems, biosecurity)**

Livestock health is, amongst others, dependent on the effect of changing farming/husbandry systems in a changing environment. Changing ecosystems, due to climate change and land-use change for instance, are expected to affect wildlife populations. Wildlife may be a reservoir for several pathogens, infectious for production animals and/or humans. Therefore, there is a need to have access to appropriate knowledge on wildlife-borne diseases to assess the need for and support the design of surveillance systems and preventive or control measures.

To obtain information on changes in the prevalence of wildlife-borne diseases in production animals (including zoonoses) and its relevance in Europe, underpinning knowledge should be developed concerning:

- relevant pathogens, their reservoirs and their intermediate and spillover hosts
- pathogen detection methods and epidemiology
- early warning and surveillance systems
- measurable risk factors and (GIS-) risk mapping with predictive power (trend analysis) on a geographical scale

**Activity line B will be funded by:  
CH, DE, DK, ES, FR, NO, SE**

**B1: Avian Influenza in wildlife and environment (Epidemiology, modeling, early warning, biosecurity)**

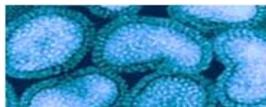
Wild birds, incl. water birds, are considered the reservoir of all influenza A viruses. The persistence of infective AIV outside the host in the environment plays a crucial role for transfer of virus.

Research proposals should be aimed at providing improved knowledge for developing epidemiological models, early warning systems and improved biosecurity. In particular improved knowledge is needed on steps and mechanisms in the transfer and decay of infective AIV outside the host in the production environment and in natural bird habitats, as well as on active reduction and elimination of infective AIV in relevant environments (soil, manure, sediments, and natural water).

**Specific topic B1 will be funded by:  
BE, DK, ES, IE, IL**

**B2: Wild boar, a reservoir for African swine fever? (ASF, pathogenesis and transmission in wild boar, early warning)**

In the EU the wild boar population varies in density but is generally increasing. ASF epidemics have been reported in wild boars suggesting their possible role as reservoir of ASFV. Disease control in wildlife is difficult due to various ecological factors.



Research on behavior of ASFV in wild boars is needed to verify the possibility of development of chronic forms of disease generating carriers, and thus having a potential role in the development of endemicity. Epidemiological studies should be carried out to determine the role of different parameters (size, density and dynamic of population, lethality of infection, effect of hunting activity, etc) in the decline of the infection or promoting the evolution of an endemic situation, and to conceive control measures.

**Specific topic B2 will be funded by:**  
BE, ES, IL

**B3: Development of risk based and cost efficient monitoring and surveillance systems for rodent borne diseases (Epidemiology, early warning, surveillance systems, invasive species)**

Rodents can harbor or function as reservoir for a plethora of pathogens that can be harmful to human or animal health. Full understanding of the epidemiology of rodent borne diseases cannot be achieved without robust data on the occurrence of pathogens, both spatially and temporally, in rodent reservoirs. The focus of attention for rodent borne diseases has mostly been directed at incidental hosts rather than the reservoir itself. For a full-fledged understanding of epidemiology of major rodent borne diseases, paramount for the development of early warning systems (including recognition of the introduction of species thus far unknown), the following topics need to be addressed:

- knowledge of the distribution of pathogens in rodent reservoirs (on endemic and trans-boundary scale)
- knowledge of the composition of rodent populations
- trans-boundary surveillance system for the benefit of early warning systems

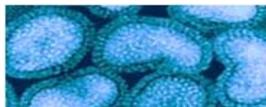
**Specific topic B3 will be funded by:**  
DK, ES, NL

**B4: Disease surveillance in combination with monitoring wildlife abundance and ecology (Wildlife population density estimation, pathogen distribution, range of host species, epidemiology, development of European wildlife diseases network)**

Wildlife can be a reservoir for diseases which pose a direct risk for humans (rabies, echinococcosis) or may endanger livestock (bluetongue, paratuberculosis). Monitoring is challenging as population sizes are often unknown and random sampling is difficult.

Harmonised methods for estimating population densities and sampling of different wildlife species are required. A European wildlife disease network is to be set up to establish a dynamic system of monitoring the pathogen distribution of selected wildlife pathogen with impact on human or animal health based on standard criteria for veterinary public health impact of pathogens (bacteria, parasites, viruses and unconventional agents) and their respective host species.

**Specific topic B4 will be funded by:**  
CZ, DE, DK, ES, IL, IT, LT



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**Activity line C: Zoonoses (re)-emerging threats, epidemiology, early warning and surveillance systems, intervention strategies)**

(Re-) emerging zoonoses can have enormous effects on human health and on society at large including the livestock sector(s). Serious economic consequences may result from control and eradication measures. Therefore, prevention and timely and effective response after disease introduction is of utmost importance. Prevention and control starts with monitoring animal reservoirs and development of efficacious vaccines.

The final goal is the development of cost-effective prevention and control strategies.

Proposals are invited to address one or more of the following:

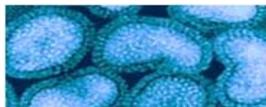
- development of cost-effective early warning systems and (epidemiology)-surveillance strategies for (re)- emerging zoonotic infections
- epidemiologic studies to improve knowledge of spread of zoonotic diseases
- development / improvement of cost-effective, rapid, highly sensitive and specific diagnostic tools for zoonotic pathogens
- harmonization of the diagnostic methods and definition of common standards for their definition
- trans-national/trans-continental data and information sharing
- cross-disciplinary approaches to understand the crucial factors needed for zoonotic pathogens to cross species barriers thereby setting the basis for the establishment of new control strategies
- cost-effective prevention and control strategies, e.g. development and implementation of vaccination-, bio security-, and/or other management procedures

**Activity line C will be funded by:**  
CH, CZ, DE, DK, FI, FR, GR, IT, LT, SE, UK

**C1: Control strategies for Campylobacter in poultry (Intervention strategies, Campylobacteriosis, biosecurity measures, molecular epidemiology, survival and spread, surveillance systems)**

Campylobacteriosis is the most common bacterial gastrointestinal disease in the EU. An EFSA Scientific Opinion considered that 'poultry is a major, if not the largest, single source of human infection' (<http://www.efsa.europa.eu/en/scdocs/scdoc/1437.htm>). Research is needed to provide a greater understanding of campylobacter behaviour (including mechanisms of pathogenicity), how they survive, are transmitted, and infect poultry (understanding host-pathogen interactions). Such data will underpin research into novel interventions. Data on effectiveness of biosecurity, and other known or novel preventative strategies, are also required to support implementation of evidence-based control measures. Collaboration with poultry producers is anticipated.

**Specific topic C1 will be funded by:**  
AT, DK, FI, GR, IE, IL, IT, LT, UK



## **C2: Development of vaccines for salmonellosis in pigs (Vaccination, salmonellosis)**

A National Control Plan (NCP) for Salmonella in pigs is due to be implemented by 2013 by all EU Member States. It is likely that a number of interventions will be required to reduce Salmonella in pigs, and an effective vaccine could be key in achieving this.

Research is needed on the development of a novel vaccine to reduce pig gut colonisation through to slaughter, in order to have the greatest impact on public health. The vaccine should target S. Typhimurium, but ideally provide protection across multiple Salmonella serovars. Other factors to consider are: vaccine safety; timing of use; practical use on-farm; regulatory requirements; differentiating vaccinated and infected pigs; and, likely cost of the final product. Collaboration / co-funding with vaccine companies is anticipated.

**Specific topic C2 will be funded by:  
CZ, DK, GR, IE, IT, UK**

## **C3: Specific emerging zoonoses**

In a first prioritisation of emerging zoonoses according to their threat for The Netherlands, i.e. likelihood of emergence, severity of disease in humans and costs of control, Japanese Encephalitis (JEV), Anaplasma Phagocytophilum and Crimean Congo Haemorrhagic Fever (CCHF) ranked high.

Research should address specific knowledge gaps for the three diseases:

- for JEV: scenario studies into the risk of emergence; inclusion in mosquito surveillance systems and in bird (waterfowl) monitoring; test development for presence of the virus in pigs
- for Anaplasma: development of diagnostic test to enable inclusion in tick monitoring
- for CCHF: vector competence studies of ticks

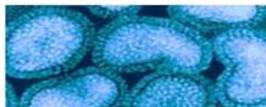
**Specific topic C3 will be funded by:  
DE, IT, NL**

## **C4: Q fever (Coxiella burnetii, diagnosis, diagnostic tools, pathogenesis and control)**

Q fever is a disease being transmitted from its natural hosts (cattle, sheep and goats) to humans via aerosols. Infection may result in seroconversion, an incapacitating flu-like disease with acute pneumonia or chronic course with life-threatening sequelae.

Aim of the call topic is to elucidate the role of the environment and of arthropods as reservoirs for animal infection, to unambiguously identify the natural (a)vertebrate host population(s), to clarify the role of air- and vector-borne routes of infection, to improve the means of serological and molecular diagnosis, to develop sensitive molecular typing tools at strain level, to develop animal models of infection to study pathogenesis, to develop meaningful strategies for control and spread of infection.

**Specific topic C4 will be funded by:  
AT, BE, DE, ES, IE, IL, IT**



#### **C5: West Nile Virus (Diagnostics, modeling, surveillance systems, strain diversity, vector competence, vaccines)**

During the last two decades, the arthropod borne West Nile virus has been introduced and even established itself in several European countries. Thus, it is important to generate information on the characteristics, like chance of introduction, spread and persistence, and on effective prevention measures of this emerging pathogen in different ecosystems/habitats in Europe.

Risk mapping or other kind of modelling to identify and predict introduction and spread is required to enable vigilant preparedness. This implies development of robust diagnostic tests, surveillance systems, and trans-national data sharing. Identification of circulating strains is important, next to factors influencing the spread of the pathogen, like habitat requirements, and competence of endemic vectors. This will support the development of preventive measures, which also could take into account opportunities for vaccine development.

**Specific topic C5 will be funded by:  
AT, BE, DE, DK, ES, GR, IE, IL, IT, NL**

#### **C6: Re-emerging cystic echinococcosis (Epidemiology, surveillance, strain typing, genotyping)**

While alveolar echinococcosis (AE) caused by *Echinococcus multilocularis* has received the interest it earns in Europe, cystic echinococcosis (CE) caused by genotypes of *E. granulosus* and other *Echinococcus* spp. has been (re)emerging with less attention.

The research topic aims at describing the epidemiology of CE caused by the re-emerging *E. granulosus* strains such as the "sheep strain" *E. granulosus* G1 e.g. in Wales and Bulgaria, the "pig strain" G7 in eastern Europe and the "cervid strains" G8 and G10 in northern Europe, and any other strain identified by collection and genotyping of material from wildlife, domestic animals or human beings, thus enabling a synthesis of the current CE situation, the causative agents and the relevant host species.

**Specific topic C6 will be funded by:  
DK, FI, GR, IE, IL, IT**

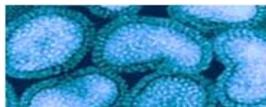
#### **C7: Escape variants of highly pathogenic zoonotic agents (Emerging new variants of viruses, genetic drift and shift, immune escape)**

Genetic modifications driven by natural selection and realized by recombination, genetic drift and shift, can evolve new or emerging virulence traits and result in large-scale transmission and concomitant alteration of pathogenicity of zoonotic agents.

Aim of the call is to foster cross-disciplinary research on pathogenicity, infectivity and transmissibility of highly pathogenic zoonotic agents.

Proposals are invited which address one or more of the following:

- to analyse variants of pathogenic agents with increased invasiveness or enhanced ability to spread
- to elucidate host-pathogen interactions which promote immune escape



- to develop methods to predict severity of disease thereby providing principles for the development of novel vaccines and anti-pathogenic compounds and innovative treatment schemes

**Specific topic C7 will be funded by:**

**DE, ES, FI, IE, IL**

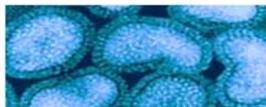
**C8: Prioritisation of zoonoses (based on e.g. impact, frequency of occurrence, economy of control strategies)**

Zoonoses are a significant burden for human and veterinary public health, livestock production, and the economy. For prioritisation, reliable assessment of the social and economic impact of zoonotic agents on humans, animals and society is indispensable. Research is invited:

- to cover data gaps regarding the public health impact of zoonotic pathogens
- to support prioritisation decisions by combining epidemiological information on disease incidence, on the attribution of zoonoses, on health outcomes of diseases, and the respective economic impacts
- to foster efficient collaborations between basic research and the medical and veterinary professions concerning zoonoses
- to develop efficient generic surveillance systems, which monitor for more than one pathogen at a time

**Specific topic C8 will be funded by:**

**DE, DK, FI, IE, IL**



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**Activity line D: Antimicrobials and anthelmintics: resistance and alternatives for use (prevalence of resistance, surveillance, interventions, alternatives (e.g. herd management, alternative medication, vaccination, feed additives))**

Animal Health has been enormously enhanced by the therapeutic use of antimicrobials in bacterial diseases and the impact of parasitic diseases has been greatly reduced by the use of anthelmintics. The use and to a certain extent, the misuse (or non-prudent use) of antimicrobials in livestock in the last 50 years, has also caused the emergence and spread of antimicrobial resistance in bacteria of livestock origin, either commensal, animal or zoonotic pathogens. Nowadays antimicrobial resistance in bacteria of animal origin affects animal and human health and results in higher therapeutic costs and loss of productivity in primary productions. Anthelmintic resistance affects disease burden, therapeutic costs, welfare and productivity in animal production in a similar way. In humans, resistant and multi-resistant zoonotic bacteria have an impact in terms of increased burden of disease and cost of illness, especially as a consequence of the transfer of resistances along the food chain. Collaborative proposals are invited that address one or more of the following topics:

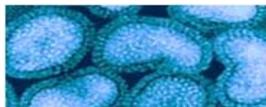
- development of cost-effective, sensitive, specific and fast detection (both phenotypic and genotypic) systems contributing to enhancement of early warning of emergence or further spread of antimicrobial resistance and multiresistance to valuable classes of antimicrobials used for animal therapy and to Critically Important Antimicrobials for human therapy in commensal bacteria, livestock and zoonotic pathogens
- improvement of the quality, accuracy, availability and timeliness of data from bacteria of animal origin, both within countries and across Member State borders, contributing to enhancement of early warning and trends of antimicrobial resistance in animal primary productions, especially for valuable antimicrobial classes in animal therapy and for Critically Important Antimicrobials in human therapy
- study of the risk factors associated with the emergence and spread of antimicrobial resistance and multiresistance towards valuable antimicrobial classes for animal therapy or critically important antimicrobials for human therapy in primary productions, in view of possible interventions
- development of innovative (or improvement of existing) alternatives for the use of antimicrobials and anthelmintics in animal productions that will contribute to an enhancement of attitudes and practices of farmers and veterinarians towards a more responsible and prudent use in primary productions (e.g. herd management, alternative medication, vaccination, feed additives)

**Activity line D will be funded by:  
CH, CZ, DE, DK, FR, GR, IT, LT, NO, SE**

**D1: MRSA (Intervention strategies, genotypic surveillance)**

Methicillin resistant *S. aureus* (MRSA) have emerged in food animals, mainly swine, in many countries. MRSA constitutes a hazard for human health and there is a need to perform research enabling eradication or reduction of MRSA in primary production.

Proposals should address one or more of the following, with the focus on development of methods for use in eradication or control programmes:



- development of cost-effective, sensitive and fast pheno- and / or genotypic methods for detection, free-testing or prevalence determination of MRSA
- identification of important factors promoting the within or between herd spread or within herd prevalence of MRSA
- development and evaluation of eradication or control strategies against MRSA

**Specific topic D1 will be funded by:  
BE, CZ, DE, DK, GR, IE, IT, NL**

### **D2: ESBL's (prevalence, genotypic surveillance)**

ESBLs are considered a major risk of AMR in humans, and are frequently reported in animals/animal products. Although epidemiology in humans and animals does not fully overlap, identical genes and plasmids were found in isolates from animal and human origin.

To generate knowledge on:

- magnitude of risk by various animal species
- adequacy of current surveillance in animals and food products to establish the risk
- identification of mobile genetic elements associated with the spread of ESBL in animal populations
- possibility to quantify the risk attribution of animals to humans by comparison of molecular characteristics of ESBL genes, plasmids and isolates from animal and humans
- association between ESBL spread and the use of antimicrobials

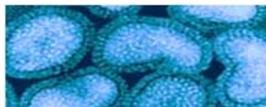
**Specific topic D2 will be funded by:  
BE, CZ, DK, IT, NL**

### **D3: Anthelmintic resistance (herd management, alternative medication)**

Gastrointestinal parasitism is a major cause of poor health, welfare and productivity in ruminants. Control of PGE relies heavily on the use of anthelmintics and resistance has developed and is now quite widespread to two classes of these drugs.

Proposals are invited which address the development of tools for the detection of and treatment regimes for effective worm control while delaying the development of anthelmintic resistance.

**Specific topic D3 will be funded by:  
DK, ES, GR, IE, IL**



#### **D4: Antimicrobial resistance of *Campylobacter* spp. along the food production chain and relationship to public health (Prevalence in animal species, food products and human; intervention measures)**

*Campylobacter* spp, one of the leading causes of bacterial food-borne disease, may be transferred from animals to humans via food. The increase in antimicrobial resistance in *Campylobacter* spp. is of concern.

The research should be focussed on:

- improving biological and/or epidemiological evidence on the resistant bacteria (including persistence, spread and prevalence) and the factors responsible for the development of resistant *Campylobacter* in animal host in different production systems
- developing novel strategies to control the development of resistant bacteria and their spread

**Specific topic D4 will be funded by:  
DK, GR, IE, IL, IT, LT**

#### **D5: Antibiotic use and intervention strategies to reduce their use in pig and dairy cattle (Reduced use of antibiotics, persuasion strategies)**

Various member states set up monitoring programmes in food producing animals to continuously estimate resistance evolution. However, follow-up of the usage of antimicrobials in the various animal populations and production systems is often lacking.

Projects should:

- develop monitoring strategies to correctly estimate antimicrobial use in a standardised way
- in a defined animal population, link data of antimicrobial resistance with drugs usage
- propose strategies to increase the awareness of field practitioners to correctly use the available antimicrobial drugs
- develop a dashboard including performance indicators and targets in order to observe the evolution in resistance, use and impact of intervention strategies

**Specific topic D5 will be funded by:  
BE, DK, IE, IL**

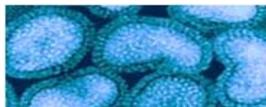
#### **D6: Metagenomic analysis of changes in gut microflora of farm animals in a response to antibiotic therapy (metagenomics, microflora, antibiotic therapy, antibiotic resistance)**

In farm animals antibiotics are used to prevent diseases especially during critical times of the animal's life. The antibiotic therapy disturbs the balance of the micro-flora leaving more space and nutrition for the antibiotic resistance bacteria.

Metagenomics methods provide a detailed knowledge of the changes in the microbiome in response to various intervention strategies. These methods can be based on next generation sequencing or high throughput PCR systems.

Collaborative proposals are invited that address one or more of the following topics:

- metagenomic analysis of changes in gut microbiome in response to antibiotic therapy at different stages in farm animal's life



- monitoring of the development of antibiotic resistance in the microflora

**Specific topic D6 will be funded by:  
CZ, DK, IE, IL, IT**

**D7: The capacity of feed/prebiotics to modulate the intestinal flora that inhibits growth of enteric pathogens (incl. zoonotic) (Feed, prebiotics, alternatives to antibiotics and anthelmintics, intestinal ecology, competitive exclusion)**

In the livestock industry there is a need for research on the use of alternatives to antibiotics to prevent common gastrointestinal diseases. These alternatives could be based on prebiotics or synbiotics involving the use of prebiotic and probiotic.

The feed/prebiotics should be investigated as alternatives to antibiotic and anthelmintics with respect to its protective and infection reducing properties against common gastrointestinal diseases in farm animals.

Collaborative proposals are invited that address one or more of the following topics:

- changes in the micro-flora in response to dietary intervention with prebiotics or synbiotics
- infection reducing properties of the dietary intervention with respect to common gastrointestinal diseases

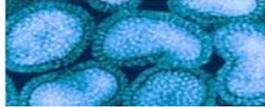
**Specific topic D7 will be funded by:  
DK, IL, LT**

**D8: Antibacterial vaccines (Vaccine development, vaccination strategy)**

One possibility to decrease incidence of bacterial infections in animals and avoid use of antibiotics is vaccination. Recent development in the understanding of host-pathogen interactions should enable construction of new marker vaccines for veterinary use enabling simple and large scale delivery, differentiation from field pathogens and combination with alternative feed additives.

The newly introduced vaccines must allow discrimination between vaccinated and infected animals. In addition, alternative vaccination strategies (e.g. aerosol vaccination in poultry against bacterial pathogens) should be included. The proposed strategies should be combined with alternative management and feeding regimes, involving feed additives of pro- or prebiotic nature.

**Specific topic D8 will be funded by:  
CZ, DK, IE, IL, NL**



### **D9: Phage therapy (Lytic phages, animal experiments)**

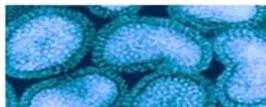
Treatment of bacterial infections with antimicrobial drugs gives rise to the selection of resistant bacteria, which may lead to treatment failure. Alternative strategies may eliminate the pathogen without selecting for resistance.

Projects should:

- select an animal bacterial infection that may serve as a model for phage therapy
- isolate and identify lytic bacteriophages for the corresponding pathogen
- study the in vitro activity of these phages or of their active components against the pathogen
- in animal experiments, demonstrate the clearing capacity of the phage treatment

**Specific topic D9 will be funded by:**

BE, DK, IL



Activity lines address broader research areas while subtopics particularly focus on more specific research. Funders may ask for proposals on the level of activity lines and/or subtopics. Project consortia are invited to apply accordingly.

**Activity line E: Production diseases – disease susceptibility (host–pathogen interaction, immunomodulation, opportunities for intervention)**

Not all of the infectious animal diseases are highly contagious with epidemic characteristics. Many diseases or syndromes evolved and progressed with the outcome conditioned by factors related to the host and its genetic profile, its immunological status (vaccinated or not, acquired immunocompetence) and to the capacity of the organism to properly react (normoreactivity). Understanding of the mechanisms of the interactions between these factors and the pathogen is considered essential to develop sustainable prevention and control strategies for animal diseases and zoonoses. Considering the complexity of the mechanisms which can lead to the development of latent or clinically evident diseases and syndromes in zootechnical animals, specific studies are needed to investigate the relationship existing between infectious agents and host-related factors, the pathogen characteristics and the host response, taking also into account the role of the environment in mediating such interactions. Projects in this area should generate knowledge on important aspects of the pathogenesis of diseases in domestic animals and ways to modify host susceptibility to pathogens. Studies on the use of immunomodulation in order to modify the adaptive immune response are also suggested.

**Activity line E will be funded by:  
CH, CZ, DE, DK, FR, IT, SE, UK**

**E1: Characterization and development of gut microflora in poultry and its resistance to bacterial pathogens (gut colonisation, immune response, natural resistance to pathogens)**

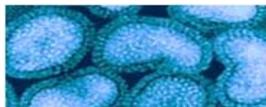
Chickens for commercial production are hatched in a clean environment and unlike all other farm animals, will never come into contact with adult birds to become colonised by the healthy microflora of adults.

Colonisation of newly hatched chickens in commercial hatcheries is a matter of coincidence. Understanding of early events in the chicken gut, gut flora characterisation and description of immune system maturation should be equally addressed. Research should also aim at active modification of gut microbiota and gut immune system resulting in an increased resistance to pathogens.

**Specific topic E1 will be funded by:  
CZ, DE, DK, GR, IL**

**E2: Respiratory pathogens of swine and their interaction with immune system of respiratory tract**

The respiratory diseases of swine are often multifactorial, involving a number of respiratory pathogens. Although the pathogenic mechanism of some of the pathogens is fairly well defined, the host response, including the immune response often remains unclear.



Research will aim at increasing the knowledge of the porcine immune system, its ability to respond to respiratory disease and on the mechanisms that the respiratory pathogens have developed to alter and evade the immune system. Acquired information will be used to develop new strategies and measures to reduce the impact of respiratory diseases in the swine industry.

**Specific topic E2 will be funded by:**  
CZ, DE, DK, ES, IE, IT

### **E3: Persistent infections in cattle (Innate immunity, mechanisms of immune tolerance)**

Persistence is an evolving condition due to the incapacity of the host defenses to eradicate the infection. In cattle, chronic infections cause economic losses and could be of public health concern when zoonotic pathogens are involved.

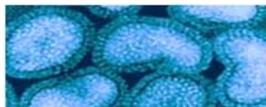
Research is needed to provide knowledge on the impact of paratuberculosis, Q fever, bovine tuberculosis, bovine viral diarrhoea, and other infections capable of evolving into chronic status and on interactions between host and pathogens that lead to chronicity and tolerance. Information can be used for developing new approaches (vaccines, therapies, immuno-modulators) and strategies to minimize the risk of persistence in animals, the health and economic consequences and the public health related risks.

**Specific topic E3 will be funded by:**  
CZ, DE, DK, IE, IL, IT

### **E4: TSE free goats (Molecular characterization and biological typing of strains, identification of resistance genes, challenge experiments)**

Genetic resistance to disease in livestock confers significant economic benefits to the farmer, government and consumer. Breeding for TSE resistance in sheep has been proven to reduce scrapie; in goats this strategy is the preferred choice of the EU. To control and eradicate goat TSEs, the current knowledge on the candidate PRNP alleles has to be completed and analysed in order to generate scientific arguments for solid and practical breeding policies applicable to various regional conditions. Breeding programmes to be developed must consider key elements related to the dissemination of potentially TSE protective polymorphisms. Data on adverse effects on production traits are to be monitored and reported.

**Specific topic E4 will be funded by:**  
ES, GR, IL, IT, NL, UK



Activity lines address broader research areas while subtopics particularly focus on more specific research. Funders may ask for proposals on the level of activity lines and/or subtopics. Project consortia are invited to apply accordingly.

**Activity line F: Production diseases – epidemiology, diagnostics and vaccination (within and between herd transmissions, diagnosis, management strategy, biosecurity, vaccination)**

Disease, including multi-factorial syndromes, is a major constraint on livestock production. Its occurrence depends on virulence, host susceptibility, farming practices and the application of prophylactic, diagnostic and therapeutic tools, when available. Technological and methodological developments are needed for improved and sustainable control strategies.

Research is required for the development of disease control strategies to limit disease spread on to and within farm, including in organic production systems, through the generation of underpinning knowledge and technological advances, in one or more of the following areas:

- epidemiology, farmer behaviour, economic assessment and risk analysis
- development of diagnostic tests and strategies for the early detection and monitoring of disease, or disease causing agents, including subclinical conditions affecting production
- promotion of disease prevention/control through improved bio-security, including vaccination or other immunological intervention

**Activity line F will be funded by:  
CH, CZ, DE, DK, FR, IT, SE, UK**

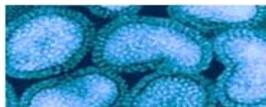
**F1: Farmer behavior and disease control (Attitude, management, biosecurity, economics)**

Tools are available for the prevention and control of many diseases at the farm level but are often not utilized. Understanding farmer attitude and how this can be influenced is essential to achieve the necessary behavioral changes to improve disease control and to prevent the introduction of diseases. Research is required to prevent disease introduction and improve control at the farm level through gaining a better understanding of the farmers' perspective and how behavioural change might be effected.

**Specific topic F1 will be funded by:  
CZ, IE, IL, NL, UK**

**F2: Control of BVD in cattle herds (persistently infected calves, vaccination, and management).**

Infection with BVDV is endemic in cattle populations in most parts of the world. The key to BVDV control is to prevent fetal infections in early gestation i.e. to interfere with the process by which persistently infected individuals are generated. An outline of a general model for BVDV control is available today, with biosecurity, virus elimination and monitoring as three necessary consecutive elements, and with vaccination as an optional step. The control strategy is built upon an initial determination of the herd BVDV status, with activities aiming at preventing new infections in non-



infected herds in parallel with systematic removal of persistently infected animals (PI) from infected herds.

Novel pestiviruses, both from cattle and sheep (such as BVDV-3 and BDV-8), have emerged over the past few years. In the context of applying effective control and eradication policies, research is required to investigate how the emergence of such viral variants may affect our epidemiological understanding of these diseases so as to ensure the effectiveness of control tools and their strategic use.

**Specific topic F2 will be funded by:**  
**BE, IE, IL, IT, UK**

### **F3: Paratuberculosis in ruminants (Regional control strategies)**

The exact prevalence of paratuberculosis is under-estimated in domestic ruminants and unknown in farmed wild ruminant populations. Risks for spread of paraTBC are increasing often associated with new practices in farm and wild animal breeding and with waste management.

The aim of research will lie in implementation of currently existing molecular biology and other methods for direct detection of causal agent of paratuberculosis in clinically and sub-clinically infected animals. Examination of faeces and tissues of animals and environmental samples has to prove the prevalence of *M. avium* subsp. paratuberculosis in the herd. An important goal would be the identification of specific and sensitive antigens for skin testing, serology and/or T-cellular tests allowing for reliable detection of infection in individual animals. Based on the established prevalence of paratuberculosis in domestic and wild ruminants and the evaluation of key risk factors for the causal agent transmission, plans for regional control and/or certification strategies are expected.

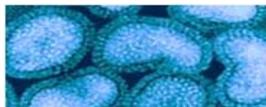
**Specific topic F3 will be funded by:**  
**BE, CZ, GR, IE, IL, IT**

### **F4: Multifactor diseases in calves (Diagnosis, pathogenesis)**

Calves are exposed to a large microbiological and immunological challenge along with stress factors such as weaning and transport. Understanding the interactions between a range of pathogens will allow improved disease control and reduce production losses

Many pathogens have been studied in isolation; however the true nature of field conditions exposes animals to many pathogens. Research should focus on co-infection studies supporting disease modelling to improve the understanding of the interactions between viral, bacterial and/or parasites on disease pathogenesis and diagnosis. This should provide important data on impacts of co-infections and allow for identification of improved disease control strategies.

**Specific topic F4 will be funded by:**  
**DE, DK, IL**



#### **F5: Improved diagnosis of mycobacterial infections (IFN-gamma test vs. antibody detection, identification of specific antigens, T-cell immunity, latency, concurrent disease)**

Mycobacterial infections of livestock have significant economic impacts and also pose a human health risk. Bovine TB testing is required by EU regulations while Johne's disease can have detrimental effects on production. Current diagnostic methods including direct detection of the presence of the causative organism and indirect detection through the presence of an immune response are viewed as insufficiently sensitive in cattle and other species.

Collaborative proposals are requested looking at one or more of the following issues.

- improvements to and development of the IFN-gamma test and of tests based on antibody detection
- identification and development of tests using specific antigens rather than tuberculin
- an improved understanding of T-cell immunity in mycobacterial diseases of livestock
- effect of latency of disease on diagnostics
- effect of concurrent disease (including paraTB) on current bovine tuberculosis diagnosis

**Specific topic F5 will be funded by:  
BE, CZ, IE, IL, IT, UK**

#### **F6: Development of vaccines against pig respiratory bacterial diseases for intranasal application**

Many pathogens enter the body via the mucosa of the respiratory tract. Development of new vaccines for an intranasal application and techniques for such administration should bring a substantial benefit in prevention of respiratory diseases.

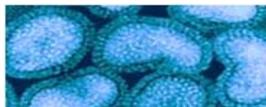
Aim of the topic is to learn more about the possibilities to induce local immunity on mucosa of the respiratory tract of pigs by intranasal application of vaccine. Particular knowledge needed includes information about ability of the immune system of respiratory tract to be activated in the early phase of life and penetration of colostrum-derived passive immunity onto mucosal surfaces. It is also important to know, how the vaccine should be applied and what kind of adjuvants should be used.

**Specific topic F6 will be funded by:  
CZ, DK, IE, IL**

#### **F7: High-Throughput methods for pathogen identification and typing (High-throughput, (multiple pathogen) diagnostics, identification, subtyping)**

Infectious diseases in livestock are one of the major concerns for the primary industry. Assessment of freedom from disease and prompt detection of animal infections require the development of cost-effective, accurate and fast diagnostic tests. Research is required on the:

- development of sensitive, specific, fast, and low cost diagnostic tests for the detection of animal pathogens, including user-friendly tests to be used directly in the field
- development of multiple-pathogen detection systems with high-throughput capabilities



- development of fast and reliable strain typing and subtyping protocols, including direct detection-typing systems

**Specific topic F7 will be funded by:**  
BE, DK, GR, IE, IL, IT

**F8: Brucella melitensis: biotyping and differential diagnostics (Strain typing, monoclonal/polyclonal antibodies)**

Occurrences of false-positive serological reactions are a major threat in the surveillance of animal brucellosis. *Yersinia enterocolitica* O: 9, *Vibrio cholerae* and *Escherichia coli* O157:H7 represent the most commonly serological cross-reacting bacteria.

Proposals are invited for the development of an international network with the aim of:

- promoting the identification and comparison of the surface proteome of *Brucella melitensis* field strains, and cross-reactive pathogens (*Yersinia enterocolitica* O: 9, *Vibrio cholerae*, *Escherichia coli* O157:H7)
- identification of *Brucella melitensis* immunogenic proteins recognised by host immune system
- production of recombinant *Brucella melitensis* immunogenic proteins for diagnostic tests and vaccines

**Specific topic F8 will be funded by:**  
BE, GR, IL, IT

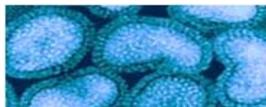
**F9: Oral fluids as alternative for serum samples (diagnostic tests, sampling protocol, epidemiology, field trials, pen side tests)**

Annually, substantial resources are spent on the collection of biological samples for diagnostic investigations. Small scale studies have shown that oral fluid can replace serum as sample material for the detection of specific antibodies and nucleic acids.

Research proposals should be aimed to validate the applicability of oral fluid as sample material as an alternative to serum samples for one or more purposes and animal species:

- comparisons of the level of antibodies against specific pathogens
- large scale validation of the suitability of oral fluid as sampling material for the diagnosis / surveillance of specific pathogens under field conditions
- examination and validation of suitable protocols for sampling, storage and transport of oral fluid samples

**Specific topic F9 will be funded by:**  
BE, DE, DK, IE, IL, IT



Activity lines address broader research areas while subtopics particularly focus on more specific research. Funders may ask for proposals on the level of activity lines and/or subtopics. Project consortia are invited to apply accordingly.

#### **Activity line G: Diseases in Aquaculture (diagnostics, vaccines, zoonotic pathogens)**

Prevention and early warning of infectious diseases in aquaculture require cost-effective, sensitive, specific and fast diagnostic tests, effective vaccines and vaccination strategies and knowledge of important factors for disease introduction and spreading. Spread of, and product contamination by, zoonotic or AMR pathogens should be mitigated.

Collaborative proposals are invited that address one or more of the following areas:

- implementation of strategic vaccination as a tool for controlling and eradicating diseases in aquaculture (including improved technologies for vaccine immune stimulation and improved methods for assessing and monitoring vaccine efficacy)
- development of sensitive, specific, fast, and low cost diagnostic tests for detection of pathogens in aquaculture
- functional genomics of important pathogens in aquaculture for understanding pathogenicity mechanisms
- molecular epidemiology and spatio-temporal analysis to get knowledge on the most important factors for disease spread and disappearance in aquaculture
- spreading of, and product contamination by, zoonotic and/or antimicrobial resistant pathogens

**Activity line G will be funded by:**

**CZ, DE, DK, ES, FR, NO, SE**

#### **G1: Zoonotic bacterial diseases, e.g. *Vibrio vulnificus*, *Mycobacterium marinum***

A number of serious fish pathogens are zoonotic. Fish production especially in warm and recirculated water poses a risk for farmers. Zoonotic bacteria also pose a risk in the food production chain. Contact zoonotic cases are underreported.

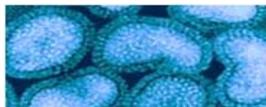
Prevention implies good information transfer between fish producers/processors, veterinarians, and medics. For risk analysis and prevention, integrated international (retrospective) monitoring of zoonotic cases in intensive aquaculture and hospital archives is needed, including virulence testing & antibiotic resistance of bacterial strains. This should result in insight into the size of the problem, a code of practice, and thereby (inter)national prevention programmes for zoonoses from aquaculture.

**Specific topic G1 will be funded by:**

**CZ, DK, GR, IL, IT, NL**

#### **G2: Koi herpes virus**

Common carp is one of the most important species in aquaculture worldwide. Since its emergence in the late 1990s, the highly infective koi herpes virus (KHV) has caused severe losses in wild and farmed carp stocks. KHV is listed as a notifiable disease.



Due to its recent discovery and distant relation to mammalian herpesviruses, basic knowledge on functional genomics of KHV is still limited. Identification and understanding of the multiple strategies of this large and complex DNA virus to evade the immune system and to persist in its host is essential for effective disease control management and vaccine development. This topic focuses on the viral mechanisms of infection and host-virus interaction during entry, replication and persistence.

**Specific topic G2 will be funded by:  
CZ, DK, IL, NL**

**G3: Disease prophylaxis for bacterial, viral and parasitic infections (fish, bivalves, crustaceans, vaccines, adjuvant, immunostimulants, host pathogen interaction, oral/immersion vaccine, ontogeny, vaccination of juveniles)**

European aquacultured species comprise several phylogenetically distant species living under different environmental conditions. Especially juveniles are exposed to the risk of infections and thus should be protected by vaccines/immunostimulants.

Improved vaccines and immunostimulants are required for different live stages of European aquacultured fish and shellfish.

Research proposals should aim at the development of:

- cost-efficient oral and immersion vaccines/immunostimulants for major diseases of aquacultured species
- new vaccine adjuvants with fewer side effects
- traceable marker vaccines and diagnostic tools to distinguish infected from vaccinated animals (DIVA) and high throughput tools for the evaluation of the immune response during ontogeny

Finally protocols to best assess the duration of protective immunity under field conditions are also required.

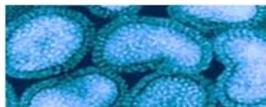
**Specific topic G3 will be funded by:  
DE, DK, ES, GR, IE, IT**

**G4: Antibiotic resistance and treatment efficacy (Transmission of resistance)**

In ornamental fish production antibiotics of critical importance to humans according to WHO definitions are commonly used. Control is lacking and the occurrence of resistance determinants of public health concern are described including transfer to humans.

The aim of the research proposals should be to quantify the prevalence of resistance traits of public health concern in ornamental fish such as Koi. Of particular concern is transferable fluoroquinolone and cephalosporin resistance in fish pathogens with a zoonotic potential like *Aeromonas*, *Vibrio* and *Enterobacteriaceae*. Resistance genes and plasmids are to be genetically characterised.

**Specific topic G4 will be funded by:  
DK, GR, IE, NL**



#### **G5: Diseases in aquaculture with water recirculation (Disease prevention and treatment strategies)**

Fish health and performance are directly related to microbiota in RAS (recirculation aquatic systems). Sustainable production of healthy fish in RAS requires a better understanding of microbial management such as the role of biofilters as a reservoir of pathogenic and/or antimicrobial resistant bacteria.

Research proposals are invited:

- to investigate the dynamics, composition and interactions of different microbial communities in RAS, including those in fish, in relation to RAS design and management
- to investigate the relation between characteristics and management of microbial communities and health and performance of fish
- to investigate the presence, survival and AMR of fish pathogenic bacteria in biological filters and the possibility of dissemination of resistance genes and pathogens from biological filters

**Specific topic G5 will be funded by:**

**CZ, DK, ES, GR, IL, NL**

#### **G6: Vaccines to viral diseases in fish, incl. stimulators of innate immunity in fish (Vaccines, plasmid DNA, delivery, adjuvant, immunostimulants)**

Prophylaxis of infectious diseases is crucial for a sustainable and environmentally compatible expansion of European aquaculture production. Viruses are among the most important pathogens, but no commercial vaccines are available for most viral diseases.

Research is required in the following fields:

- promising experimental DNA vaccines against important fish rhabdoviruses like VHSV and IHNV in salmonids and SVCV in carp are available but delivery methods allowing mass vaccination of small fish needs to be developed
- also, optimising in terms regulatory DNA elements (i.e. promoter) and molecular adjuvant and immunostimulants is required to obtain an optimal dose-response effect
- the ability of the viruses to develop resistance to, or escape from, the induced immunity must also be addressed

**Specific topic G6 will be funded by:**

**CZ, DK, ES, GR, IE, IL**

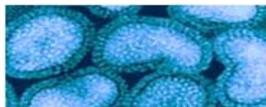
#### **G7: Virulence markers for fish pathogens (Diagnostics, virulence markers, typing assays)**

Many fish pathogens occur in virulent and non-virulent variants, including viral pathogens causing serious and notifiable fish diseases like VHS, KHV and ISA. This complicates diagnostics and disease monitoring. Genetic or antigen markers for virulence and related typing assays should be developed. Topics to be addressed are:

- identification of virulence markers and traits of serious fish pathogens
- development of fast and reliable diagnostic methods for discrimination between virulent and non-virulent isolates (assessment of factors triggering increases in pathogen virulence, particularly when non virulent strains are present)

**Specific topic G7 will be funded by:**

**DK, ES, GR, IE, IL**



Activity lines address broader research areas while subtopics particularly focus on more specific research. Funders may ask for proposals on the level of activity lines and/or subtopics. Project consortia are invited to apply accordingly.

#### **Activity line H: Epizootic diseases (Swine Fevers, AI, FMD, Tb)**

Epizootic diseases such as Foot-and-Mouth Disease, Avian influenza, Swine fevers, as well as Peste des petits ruminants continue to pose a threat for animal health, production and welfare. For the development of effective control tools including diagnostic tests, knowledge about disease dynamics and pathogenesis is of paramount importance.

Recent outbreaks of epizootic diseases such as Foot-and-Mouth Disease and African swine fever underline their impact on animal health, production, and trade. Despite tremendous control efforts, a constant risk of introduction into the EU cannot be negated. To optimise control strategies for epizootic diseases, improved understanding of underlying mechanisms is needed. This includes exploitation of genetic knowledge obtained by modern techniques like next generation sequencing. Research proposals should address host pathogen interactions, immune response and pathogenesis in the broader sense, including investigation of virulence and persistence factors. Tools should be developed for monitoring, prevention and control, especially through research on vaccines and diagnostics.

**Activity line H will be funded by:  
BE, CH, CZ, DE, DK, FR, SE, UK**

#### **H1: Avian Influenza (diagnosis, control and prevention)**

Avian influenza is an epizootic animal disease with a high zoonotic potential and the capacity for pandemic infections. Therefore, research for improving diagnosis, control and prevention could have a major impact on both animal and human health.

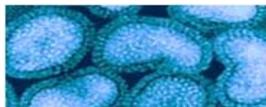
To improve diagnosis, control and prevention of avian influenza (AI), the major aims of this research topic are to (i) attain a better understanding of the epidemiology of AI viruses (especially H7 and H5) in wild birds and the determinants that allow transmission to domestic birds and mammals, (ii) improve surveillance methods including multiplexed, species-independent detection and characterization of AI-specific antibodies, (iii) optimise the available preventive methods including vaccination.

**Specific topic H1 will be funded by:  
BE, DE, DK, ES**

#### **H2: FMD, immune response to infection versus vaccination (Virus persistence, protection, tropism, host response)**

Economically foot-and-mouth disease remains one of the most important diseases of farm animals. Incursions of the virus into Europe (e.g. U.K. in 2001) and other disease free areas (e.g. Japan in 2000 and 2010) result in huge economic losses.

Current FMDV vaccines use chemically inactivated viruses and these induce relatively short-term protection against a limited spectrum of viruses and do not block long term virus persistence. There is a



need to define the innate and acquired immune responses to these FMDV vaccines compared to those induced by FMDV infection within natural host animals. In addition, anti-FMDV responses to novel vaccine candidates based on systems that express FMDV capsid proteins within animals need to be determined.

**Specific topic H2 will be funded by:**  
BE, DK, ES, IE, IL

**H3: CSF/ASF pathogenesis in domestic pigs and wild boar (Virus persistence, host-virus interaction, virulence, hemostaseology, immune response, cytokine environment, strain Spec. natural virus resistance)**

African and classical swine fevers are among the most important diseases of pigs, and the current disease situation puts the EU at constant risk of introduction. To optimize control strategies, improved understanding of the diseases is needed.

Both swine fevers share clinical and pathological signs as well as pathogenetical aspects in both domestic pigs and wild boar. The underlying mechanisms are still far from being fully understood. To improve understanding of disease dynamics and pathogenesis, and to provide a basis for new effective control tools, this research topic should address (i) virulence determinants, (ii) mechanisms of virus persistence in affected populations, and (iii) host virus interactions and immune response.

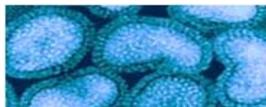
**Specific topic H3 will be funded by:**  
BE, DE, DK, ES, IE, IL, IT

**H4: Molecular epidemiology of epizootic diseases using next generation sequencing technology (Next generation sequencing, molecular epidemiology, persistence of strains in populations, evolution of virus strains, phylogeny)**

Our knowledge of the dynamics of virus evolution and the interplay of different factors influencing is limited. Constant evolution helps viruses escape the host defence, alter their pathogenicity and host range, and may even result in them evading diagnostics.

Random introduction of mutations into the genome by the viral nucleic acid polymerase during genome replication is assumed to be a mechanism underlying the constant evolution, especially in RNA viruses. Using next generation ultra-deep sequencing, the complexity of the mixture of genome variants (quasispecies) found in virus isolates can be analysed. Alterations of the genome composition should be investigated both qualitatively and quantitatively to help the understanding of virus evolution and to enhance the application for the technology referred to, how the technology can be applied in an epidemiological context.

**Specific topic H4 will be funded by:**  
BE, CZ, DK, ES, IE, IL, IT

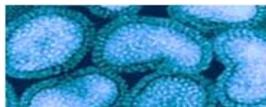


## ANNEX: FUNDING SCHEME BY COUNTRY

AT	BE	CH	CZ	DE	DK	ES	FI	FR	GR	IE	IL	IT	LT	NL	NO	SE	UK
C1	A	A	A6	A	A	A	C	A	A	A3	A1	A1	B4	A1	A	A	A
C4	A2	B	B4	A1	A1	A1	C1	B	C	A4	A2	A2	C	A5	B	B	A2
C5	A3	C	C	A2	A2	A2	C6	C	C1	A5	A4	A6	C1	B3	D	C	C
	A4	D	C2	A5	A3	A3	C7	D	C2	A6	A5	B4	D	C3	G	D	C1
	A5	E	D	A6	A4	A4	C8	E	C5	B1	A6	C	D4	C5		E	C2
	A6	F	D1	B	A5	A5		F	C6	C1	B1	C1	D7	D1		F	E
	B1	H	D2	B4	A6	A6		G	D	C2	B2	C2		D2		G	E4
	B2		D6	C	B	B		H	D1	C4	B4	C3		D8		H	F
	C4		D8	C3	B1	B1			D3	C5	C1	C4		E4			F1
	C5		E	C4	B3	B2			D4	C6	C4	C5		F1			F2
	D1		E1	C5	B4	B3			E1	C7	C5	C6		G1			F5
	D2		E2	C7	C	B4			E4	C8	C6	D		G2			H
	D5		E3	C8	C1	C4			F3	D1	C7	D1		G4			
	D9		F	D	C2	C5			F7	D3	C8	D2		G5			
	F2		F1	D1	C5	C7			F8	D4	D3	D4					
	F3		F3	E	C6	D3			G1	D5	D4	D6					
	F5		F5	E1	C8	E2			G3	D6	D5	E					
	F7		F6	E2	D	E4			G4	D8	D6	E2					
	F8		G	E3	D1	G			G5	E2	D7	E3					
	F9		G1	F	D2	G3			G6	E3	D8	E4					
	H		G2	F4	D3	G5			G7	F1	D9	F					
	H1		G5	F9	D4	G6				F2	E1	F2					
	H2		G6	G	D5	G7				F3	E3	F3					
	H3		H	G3	D6	H1				F5	E4	F5					
	H4		H4	H	D7	H2				F6	F1	F7					
				H1	D8	H3				F7	F2	F8					
				H3	D9	H4				F9	F3	F9					
				E						G3	F4	G1					
				E1						G4	F5	G3					
				E2						G6	F6	H3					
				E3						G7	F7	H4					
				F						H2	F8						
				F4						H3	F9						
				F6						H4	G1						
				F7							G2						
				F9							G5						
				G							G6						
				G1							G7						
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				H1													
				H2													
				H3													
				H4													

**Please note:** \*<sup>1</sup>The Italian Ministry of Agricultural Food and Forestry Policies will fund activity lines D, F and the specific topic C2, whereas the Italian Ministry of Health will fund activity lines C, D, E, F, and the specific topics A1, A2, A6, B4, C1, C2, C3, C4, C5, C6, D1, D2, D4, D6, E2, E3, E4, F2, F3, F5, F7, F8, F9, G1, G3, H3 and H4.

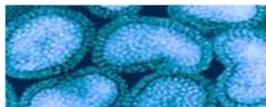
\*<sup>2</sup>The German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) will fund activity lines A, B, C, D, E, F, G, H and the specific topics A2, A5, B4, C3, C7, D1, E1, E2, E3, F4, F9, G3, H1 and H3, whereas the German Federal Ministry of Education & Research (BMBF) will fund activity line A, C, D, F, and the specific topics A1, A2, A5, A6, C3, C4, C5, C7, C8, E2 and E3.



## ANNEX: NATIONAL CONTACTS

In total, the following EMIDA partners from 18 different countries will take part in funding the SECOND EMIDA Call with “distributed common pot” funding.

Country	Name	National Contact Person	Contact details
 AT	Federal Ministry of Health	Hermann Schobesberger	<a href="mailto:Hermann.Schobesberger@ages.at">Hermann.Schobesberger@ages.at</a> +43 664 9670974
 BE	Veterinary & Agrochemical Research Centre	Hein Imberechts	<a href="mailto:Hein.Imberechts@var.fgov.be">Hein.Imberechts@var.fgov.be</a> +32 2 379 0426
 CZ	Ministry of Agriculture, Department of Research & Development	Milan Podsedníček	<a href="mailto:Milan.Podsednicek@mze.cz">Milan.Podsednicek@mze.cz</a> +420 221812133
 DK	Ministry of Food, Agriculture & Fisheries	Lars Arne Jensen	<a href="mailto:lari@ferv.dk">lari@ferv.dk</a> +45 41 89 25 26
 FI	Ministry of Agriculture and Forestry	Katri Levonen	<a href="mailto:katri.levonen@mmm.fi">katri.levonen@mmm.fi</a> +358 916053437
 FR	The French National Research Agency (ANR)	Serawit Bruck	<a href="mailto:serawit.bruck@agencerecherche.fr">serawit.bruck@agencerecherche.fr</a> +33 173 54 81 70
 DE	Federal Ministry of Education & Research (BMBF)	Sabine Dues Petra E. Schulte	<a href="mailto:s.dues@fz-juelich.de">s.dues@fz-juelich.de</a> +49 2461 61 9286 <a href="mailto:Petra.Schulte@fz-juelich.de">Petra.Schulte@fz-juelich.de</a> +49 2461 61 9031
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 GR	Ministry of Ministry of Education, Lifelong Learning and Religious Affairs, General Secretariat for Research & Technology, International S&T Cooperation Directorate	Chrysoula Diamanti	<a href="mailto:cdiama@gsrt.gr">cdiama@gsrt.gr</a> +30 210 74 58 190
 IE	Department of Agriculture, Fisheries & Food	Michael Gunn	<a href="mailto:Michael.Gunn@agriculture.gov.ie">Michael.Gunn@agriculture.gov.ie</a> +353 1 6157103
 IL	Ministry of Agriculture & rural development, veterinary services & animal health, Kimron Veterinary Institute	Boris Yacobson	<a href="mailto:Dir-kimron@moag.gov.il">Dir-kimron@moag.gov.il</a> +972 3 9681682
 IT	Ministry of Agricultural Food and Forestry Policies	Alberto Masci	<a href="mailto:a.masci@politicheagricole.gov.it">a.masci@politicheagricole.gov.it</a> +39 06 46655085
	Ministry of Health– Dep. for Veterinary Public Health, Nutrition & Food Safety	Marina Bagni	<a href="mailto:marina.bagni@sanita.it">marina.bagni@sanita.it</a> +39 06 5994 6129
 LT	The Ministry of Agriculture of Lithuania	Antanas Sederevicius	<a href="mailto:Antanas@lva.lt">Antanas@lva.lt</a> +370 37 363362
 NL	Ministry of Economic Affairs, Agriculture & Innovation	Albert Meijering	<a href="mailto:A.Meijering@minlnv.nl">A.Meijering@minlnv.nl</a> +31 6 54232285
	Food & Consumer Product Safety Authority	Wim Ooms	<a href="mailto:Wim.Ooms@vwa.nl">Wim.Ooms@vwa.nl</a> +31 70 448 4088
 NO	The Research Council of Norway	Øystein Rønning	<a href="mailto:Oro@rcn.no">Oro@rcn.no</a> +47 22037106
 ES	INIA	Joan Calvera	<a href="mailto:calvera@inia.es">calvera@inia.es</a> +34 91 34 76 801
 SE	The Swedish Research Council for Environment, Agricultural Sciences & Spatial Planning	Johanna Dernfalk	<a href="mailto:Johanna.dernfalk@formas.se">Johanna.dernfalk@formas.se</a> +46 8 775 4021
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## ANNEX: SPECIAL NATIONAL REGULATIONS

The following national regulations might be of interest for ALL participants within a research consortium (for more detailed and specific national regulations see guidelines for applicants on [www.submission-emida-era.net](http://www.submission-emida-era.net)):

### France:

France is funding all 8 Activity Lines with no priorities.

### Germany

#### BMBF:

Universities and research institutes are encouraged to collaborate with a company. The company must be registered in Germany. Details are described in the national announcement:

[http://www.bmbf.de/foerderungen/677\\_4321.php](http://www.bmbf.de/foerderungen/677_4321.php)

#### BMELV:

Details on funding regulations will be available after March 7<sup>th</sup> on [www.ble.de](http://www.ble.de)

### The Netherlands:

Proposals are only eligible for funding if they address one of the *specific topics* supported by The Netherlands (EL&I and/or nVWA)

Funding will be granted under the “Algemene voorwaarden voor het verrichten van onderzoek ten behoeve van het Ministerie van Landbouw, Natuur en Voedselkwaliteit” (februari 2004). However when a DLO institute is the first contractor on the national level, the “Subsidievoorwaarden DLO” and the “LNV tarieven” will apply.

Maximum funding available, from the combination of EL&I and nVWA, is 1.25 M€ for the total call.

### Spain:

#### Eligibility

The call is addressed to public research institutions and other bodies (non-profit bodies, agencies, private entrepreneurs or labs) which are associated to a public research institution.

The body selected for financing will establish an agreement with INIA where both will fix the terms of the contract.

#### Funding

##### Admitted costs

Salaries: Only for non-permanent scientific staff and non-permanent technicians hired for the project.

Fungible materials

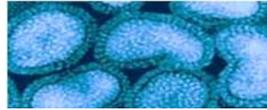
Travel and subsistence costs

Indirect costs: Not exceeding 20 % of the direct costs (DC = a + b +c)

The funds will be transferred to the beneficiary in three annual payments.

### Switzerland:

Potential Swiss project consortia partners must contact their national contact point before agreeing to participate in a consortium and before submitting a Pre-Proposal. This is mandatory in order to receive



potential funding from the Swiss Federal Veterinary Office (SFVO), and it is needed to get an indication how much national funding might be available for any particular subject within each topic. Funding will be provided only for projects covering topics within the SFVO's "Focus of Research 2008-2011" (<http://www.bvet.admin.ch/org/01028/01029/index.html?lang=de>) and within the "Animal Health Strategy 2010+" ([http://www.bvet.admin.ch/gesundheit\\_tiere/03007/index.html?lang=de](http://www.bvet.admin.ch/gesundheit_tiere/03007/index.html?lang=de)).