



**RÉPUBLIQUE  
FRANÇAISE**

*Liberté  
Égalité  
Fraternité*

**INRAE**



**VetAgro Sup**



**UMR0346**

## Epidemiology of Animal and Zoonotic Diseases (EPIA)

### Management

Xavier Bailly, Director  
Karine Chalvet-Monfray, Deputy Director  
Philippe Lecomte, Deputy Director and Support functions Facilitator  
Sophie Carles, Deputy Coordinator of the ESA facility

### Research topics

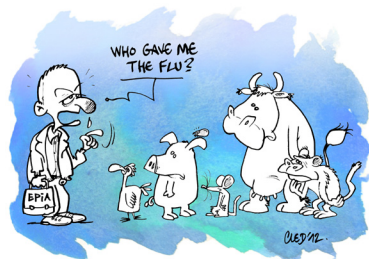
- Ticks and associated pathogens
- Livestock farming practices and infection risk / monitoring and distribution of diseases

### Key figures

- 10 researchers and lecturer-researchers
- 20 engineers
- 4 technicians and administrative staff

### Keywords

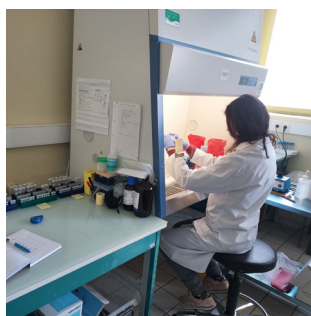
- Epidemiology
- Zoonoses
- Vectors
- Ticks
- Livestock farming



### Mission and objectives

The joint research unit (UMR) "Epidemiology of Animal and Zoonotic Diseases" (EPIA) is jointly run by INRAE and VetAgro Sup.

To prevent risks of infection related to global changes and to encourage the agroecological transition, the unit studies the epidemiology of infectious diseases in animal populations, some of which are transmissible to humans. The unit is original in its integrated approach combining epidemiology, biology, ecology and evolution and making use of modelling and artificial intelligence.



Photos: ©INRAE/AdobeStock

The main objectives are to:

- study the relationships between livestock farming practices and infection risk, how such practices are monitored and their impact on disease distribution. We contribute to monitoring health risks through the ESA facility. We model the development of pathogen populations on livestock farms and their transmission between farms. Our objective is to identify the levers that will reduce both transmission and antibiotic use in livestock farming.
- analyse and model the spatial and temporal distribution of ticks, of the pathogens carried by those ticks and of the associated health risks. We use data from participative tick observation and monitoring programmes. We study the transmission of pathogens and of the resulting diseases. We model the risk of transmission in order to understand how it is changing in the environment and to inform both public authorities and the general public.

The unit's work mainly involves:

- the spatial and temporal construction of animal and zoonotic risk in the context of global change, dividing it into two components:
- for sustainable livestock-farming systems: provide support for public policies for monitoring and management of animal diseases, better understand the ecology of microbial systems in order to reduce antibiotic use.
- to prevent zoonoses related to wild and domesticated fauna: understand the link between host community diversity and zoonotic risk, predict changes in vectorial risk in the context of changes in climate and land use, develop participative prevention of zoonotic risk.

 Centre  
Lyon-Grenoble Auvergne-Rhône-Alpes



Campus vétérinaire de VetAgro Sup  
1 avenue Bourgelat  
69280 Marcy-l'Étoile  
Tel.: + 33 (0)4 78 87 25 25

<https://eng-epia.clermont.hub.inrae.fr/>



RÉPUBLIQUE  
FRANÇAISE

Liberté  
Égalité  
Fraternité



UMR0346



<https://www.plateforme-esa.fr/fr>



<https://www.citique.fr/>

INRAE



VetAgro Sup

## Research

The unit's research is directed towards pathogens and diseases that are of interest in terms of animal and public health (zoonoses). These include diseases that are both directly transmitted (avian flu, Q fever, leptospirosis, Bovine Viral Diarrhoea (BVD), etc.) and vector-borne (Lyme's disease, Tick-Borne Encephalitis (TBE), human granulocytic anaplasmosis, bluetongue). The UMR is also working on the development of bacterial resistance to antibiotics.

## Collaboration and expertise

The unit is engaged in scientific collaboration at three levels:

**Regional:** SAARA network, Hub-VPH, Shape-med@ Lyon, BIOENVIS research federation in the Métropole Grand Lyon, IRC-SAE, SysMyc research federation in Clermont-Ferrand;

**National:** ANSES, CIRAD, GDS France, SOERE Tempo, etc.;

**International:** Thailand, Bangladesh, United Kingdom, Canada, etc.

The unit also works regularly in collaboration with public and private stakeholders in the field (DDCSPP, ARS, GDS, livestock farmers, RESPE, GTV, TERANA, etc.

EPIA staff are also involved in the Epidemiological Surveillance in Animal health (ESA National Platform), which provides methodological and operational support to relevant state bodies and other managers of biological and health monitoring systems in France with respect to the design, deployment, operation, results' dissemination and evaluation of such systems. The ESA platform's objective is to improve the efficiency of monitoring in order to help with decision support and solution implementation.

EPIA is directly involved in the CiTIQUE national participative science programme which enables members of the public to contribute to tick research by reporting bites and sending in ticks.

## Scientific facilities

EPIA carries out regular field campaigns enabling it to obtain data relevant to the study of different pathogens, sensitive vectors and animals and disease reservoirs. It has a well-equipped field laboratory for preparing the various samples that are harvested.

These samples can then be analysed by the unit's molecular biology laboratory in order to detect and identify the pathogens being studied using direct pathogen nucleic acid detection methods (PCR in plates and ddPCR). In some matrices, the use of PCR in real time gives quantitative results in equivalent number of pathogenic bacterial genomes. Our high-speed sequencing capacity for long or short fragments enables us to characterise pathogens' genetic diversity. We can use the ELISA serological method to indirectly characterise an organism's exposure to a pathogen.

The unit has developed – and maintains – computer servers with adequate calculation power to support epidemiological modelling, phylogenetic studies and artificial intelligence projects.

## Teaching

EPIA staff teach in various types of courses in both veterinary training and universities. In Lyon, we are involved in the One-Health Master's degree, the University Research School EID@Lyon and partly attached to the E2M2 doctoral school. In Clermont-Ferrand, we contribute to Polytech's core curriculum, to the Master's in Microbiology "Emergence et diffusion des pathogènes" and to the SVSAE doctoral school. We also teach in foreign establishments, for example Mahidol University (Thailand) and the University of Montreal (Canada) in Master's and Doctorate courses on the modelling of transmissible diseases including zoonoses and emerging diseases. Every year the unit hosts about 10 interns, from 15-year-olds on work experience to Master's students, as well as PhD students and post-doctoral researchers.



Centre  
Lyon-Grenoble Auvergne-Rhône-Alpes