

PhD student – fixed term (36 months)

Location

Institut Agronomique et Vétérinaire Hassan II (IAV), Rabat, Morocco
INRAE (ENVT campus), Toulouse, France

Salary

Approximately 1834,2€ net monthly (free accommodation in the IAV boarding school) in Morocco.

Application deadline

30 April 2025

Interview dates

June 2025

Starting date

September 1st 2025

PhD project: Rethinking Avian Influenza Virus surveillance in a context of vaccination

Background on the VIVACE doctoral Network

While outbreaks of highly pathogenic avian influenza viruses (HPAIV) in Europe used to be rare and geographically contained, the situation has dramatically changed in the last few years with thousands of outbreaks reported in domestic poultry and wild birds. Despite being an intensive field of research, many unknowns remain as we are still struggling to predict HPAIV incursion in poultry, avoid viral spread and limit the socio-economic impact entailed predominantly by control measures. Vaccination of poultry against avian influenza, which used to be prohibited in the European Union (EU) due to trade restrictions, is now being given full consideration, as it is becoming clear that traditional prevention and control approaches alone will not curb the accelerating pace of occurrence of devastating HPAIV epidemics. However, vaccinating poultry does not come without important challenges. The project VIVACE aims at putting together an ambitious doctoral network, composed of 13 PhD scholarships, to contribute to fully integrate poultry vaccination approaches into efficient management strategies for HPAIV. This will be done by unravelling the impact current and upcoming EU vaccination policies will have on avian influenza virus evolution, surveillance and control strategies and societal burden of HPAI. For this, VIVACE will use a combination of disciplines from life sciences, epidemiology, computer sciences and social and behavioural sciences. The consortium gathers 15 leading universities or research institutes and 5 private companies, securing both inter-sectoriality and wide geographic distribution with tailored epidemiological and vaccination contexts.

Objectives of the PhD project

With a view of designing innovative surveillance approaches for avian influenza viruses when vaccination is implemented, this project aims to evaluate the effectiveness of various sampling strategies, including the environment, in contexts where the virus is endemic, clinical manifestations are limited and vaccination against H9 viruses is commonly practiced. Specifically, the PhD candidate will sample different types of materials in Moroccan poultry farms (broiler farms, breeder-broiler farms and layer hens with or without H9 vaccination), including bird samples (oropharyngeal swabs, tracheal swabs and feather samples) and environmental samples (dust wipes, water, food and air). Viruses will be detected by RT-qPCR and genetically characterized in each sample at the IAV. During a secondment at INRAE, latent-class statistical models will be adjusted to the cross-detection of birds to

estimate the sensitivity and specificity of each sample type in detecting H9 viruses in vaccinated and non-vaccinated farms. The collected field data will then be used to adjust mathematical models in order to characterize virus transmission dynamics in vaccinated and non-vaccinated flocks. These two sub-tasks will then be combined into an extensive disease simulation framework to investigate various sampling strategies in order to optimize the timeliness of detection of H9 viruses in vaccinated and non-vaccinated flocks, and generate policy recommendations for surveillance of low pathogenic avian influenza viruses in a context of vaccination.

Supervisors

Prof. Siham Fellahi is the Head of the Avian Pathology Unit at IAV Hassan II in Rabat, Morocco. She has a strong interest in poultry health, the development of new protection strategies and diagnostic tools into avian diseases including avian influenza, avian infectious bronchitis, infectious bursal disease and Newcastle disease, etc. She contributed to around 80 publications, including papers in international referee's journals, papers and abstracts published in the proceeding of conferences.

Dr Timothée Vergne (INRAE, Toulouse, France) is an Associate Professor of Veterinary Public Health at the National Veterinary School of Toulouse (ENVT). He leads the [Epidesa group](#), a dynamic international team of researchers dedicated to the improvement of livestock and farmers well-being through the use of modern epidemiological techniques. His primary research interests include the understanding of detection and transmission processes of infectious diseases using statistical and mathematical modelling tools, in order to optimize the way infectious diseases are managed. He is one of the three co-coordinators of the VIVACE project.

Research location

The PhD candidate will conduct his/her research at the IAV Hassan II, located in Rabat, Morocco, and at INRAE, within the Epidesa group of the Host-Pathogen Interaction Unit (IHAP) on the campus of the National Veterinary School of Toulouse (ENVT), France. The candidate will be involved in extensive field missions in Morocco and have secondment periods at the ENVT, France, for data analysis. The candidate will be engaged in a dual-degree PhD and will receive a joint diploma from the University of Rabat, Morocco, and the University of Toulouse, France.

Academic qualifications and experience

The ideal PhD candidate should possess a Master's degree or equivalent in Veterinary Medicine, Animal Science, Biology, Microbiology, Virology, Epidemiology, Biostatistics, or a related field, with a solid academic foundation in infectious diseases, molecular biology, or epidemiology. Candidates should have prior research experience in laboratory or field studies, particularly in virology, microbiology, or animal health, and demonstrate proficiency in molecular diagnostic techniques such as RT-qPCR and pathogen detection. Familiarity with statistical analysis and the R software is essential, while experience in mathematical modelling would be highly advantageous. The candidate should exhibit strong scientific writing and communication skills, with fluency in English and French; knowledge of Arabic would be a bonus, given the field activities in Morocco. Strong organizational and time-management skills, the ability to work independently and collaboratively within multidisciplinary teams, and a willingness to conduct fieldwork in poultry farms are crucial. As the project is part of the VIVACE doctoral network (Marie Skłodowska-Curie Action), candidates must meet mobility requirements by not having resided or conducted their main

activities (work, studies, etc.) in Morocco for more than twelve months during the three years preceding the start of the PhD project.

How to apply

Please send your application **before 30 April 2025** to Profs Timothée Vergne (timothee.vergne@envt.fr) and Siham FELLAHI (s.fellahi@iav.ac.ma). Your application should include:

- your CV
- two reference letters
- a short motivation letter (max 1 page) where you state why you are interested and what experience you have to address the aspects of the project

Online interviews of shortlisted candidates will be held in June 2025.

For further information, please contact Profs Timothée Vergne (timothee.vergne@envt.fr) and Siham FELLAHI (s.fellahi@iav.ac.ma).

Key references

Arbani O, Ducatez MF, Mahmoudi S, Salamat F, Khayi S, Mouahid M, Selim KM, Kichou F, Ouchhour I, El Houadfi M, Fellahi S. 2023. Low Pathogenic Avian Influenza H9N2 Viruses in Morocco: Antigenic and Molecular Evolution from 2021 to 2023. *Viruses*. 2023 Nov 30;15(12):2355. doi: 10.3390/v15122355.

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Bessière, P., Hayes, B., Filaire, F., Lèbre, L., Vergne, T., Pinson, M., Croville, G., Guérin, J.-L., 2023. Optimizing environmental viral surveillance: bovine serum albumin increases RT-qPCR sensitivity for high pathogenicity avian influenza H5Nx virus detection from dust samples. *Microbiol. Spectr.* 2024; 11, e0305523. <https://doi.org/10.1128/spectrum.03055-23>

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