# Post-doctoral position proposal

| Hosting organization - Employer | |
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| Organization | INRAE: French National Institute for Agriculture, Food and Environment; Animal Health Division |
| Research Unit | UMR1300 BIOEPAR (INRAE, Oniris), DYNAMO team |
| Full Address | Oniris, site de la Chantrerie, 101 route du Gachet, CS40706, 44307 Nantes, France |

| Contact persons | |
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| Full names | CECILIA Hélène (INRAE), DURAND Benoit (ANSES) |
| Positions | Both are full time permanent researchers |
| Email addresses | helene.cecilia@inrae.fr ; benoit.durand@anses.fr |

| Research proposal | |
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| Title | **Constrained epidemiological modelling for epizootic haemorrhagic disease (EHD) vaccination protocols** |
| Starting date | As soon as possible, no later than May 2025 |
| Duration | Minimum 18 months |
| Salary | Basic gross salary ~3100-4000 €/month (according to experience) |
| Expected skills | PhD in mathematical modelling or closely-related disciplines<br>Experience in mechanistic modelling required, application to a biological system would be a plus<br>Experience in optimal control theory or complex inference methods<br>Excellent programming skills (Python / C++ / R)<br>Interest in infectious diseases, epidemiology, interdisciplinary research<br>Willingness to make results accessible to stakeholders, and take their expectations into account<br>Strong organizational and written/oral communication skills, fluency in English (French is not mandatory but is a plus)<br>Be highly motivated towards scientific research |
| Proposal description | Epizootic haemorrhagic disease (EHD) is a viral, vector-borne disease transmitted by midges of the genus *Culicoides*. EHD has important consequences in cattle herds. The virus was first discovered in the United States in 1955, and has since spread to Asia, Australia and Africa. It was first detected in Europe in 2022 (in Italy and then Spain), before reaching France in 2023. A vaccine for the serotype 8 currently circulating in France has just received a temporary authorization of use, but methods are still lacking to identify effective targeted vaccination protocols, taking into account resource constraints (number of doses and deployment time) and the spatio-temporal heterogeneity of host distribution.<br>To develop such a method, you will :<br>• adapt and extend the framework previously developed by a team from ANSES (Courtejoie et al. 2019 https://doi.org/10.1016/j.prevetmed.2019.104744 ), on the spatio-temporal spread of bluetongue, a vector-borne disease with characteristics similar to those of EHD. The model included cattle and sheep populations, different contact networks, and the effect of vaccination campaigns.<br>• use EHD data (French 2023-2024 outbreak) to fit the model<br>• develop from scratch an algorithm to optimize vaccine allocation in space and time depending on different constraints (number of doses available, human effort, etc.). Multiple optimization criteria will be considered (animal mortality, cost, extent of spread...)<br>• identify best vaccination strategies to control EHD spread in France |

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| | • contribute to turn this model into a generic tool that can be used to tackle any EHD and BTV serotype circulating in Europe<br><br>You will be part of a team of ~10 experienced modelers, including engineers available for technical support (C++, Python, R). This work will be done in close collaboration with ANSES (B. Durand). Regular stays will be organized in Paris to meet with the ANSES team. The project is fully funded by the french government. All the required computing resources and data will be made available.<br><br>The project also involves CIRAD (UMR ASTRE) on the epidemiology of EHD and the population dynamics of its vector, as well as VetAgroSup (UMR LBBE) on wind-mediated transmission. Regular interactions with stakeholders will take place, as there are strong expectations on how these modeling results can inform policy.<br><br>Note that several modeling projects are currently on-going in the hosting teams applied to vector-borne diseases, which offer real opportunities for contract extension. |
| How to apply | Please, send simultaneously to both contact persons: your CV, a cover letter expressing your research experiences and interests, and at least two reference letters (or contact details of referees).<br>The position is currently available.<br>Review of applications starts immediately and will stop as soon as the position is filled. |