

## HABILITATION A DIRIGER DES RECHERCHES

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### Résumé

My research aims to gain a better understanding the dynamics of transboundary animal diseases, or TADs, in both endemic and disease-free settings, in order to support decision-making in the management of these complex health problems. TADs have considerable impacts on animal health, animal welfare and productivity. The numerous eco-epidemiological and social factors that affect the dynamics of disease transmission contribute to the creation of complex and locally specific epidemiological systems, where viral genetic diversity and interactions between several hosts converge to facilitate viral persistence, introduction and spread. In my research, I therefore focused on better understanding the spatial and spatio-temporal dynamics of emerging (and re-emerging) TADs and evaluating how these geographical heterogeneities may impact efficiency of disease surveillance and control strategies. In this context, my research was organized around three inter-related axes: i) Better understand the spatial determinants of disease risks, ii) Clarify how pathogens spread in structured populations, evaluate how such heterogeneities would affect disease transmission at different geographical scales and assess how these spatial heterogeneities may impact the cost- effectiveness of mitigation strategies, and iii) better understand how demography variations of natural populations (reservoirs or vectors) influence the local persistence and epidemic success of TADs in livestock populations.

By design, my research is an interdisciplinary venture, combining ecology and epidemiology with statistics and biomathematics, clinical research, science communication and policymaking. This work has enabled me to appreciate the benefits of transdisciplinary approaches to better analyse disease transmission dynamics and develop appropriate responses. As such, in recent years, I complemented my quantitative approaches with qualitative research, looking at the social and individual decision-making aspects of livestock management and diseases prevention to provide novel and relevant ways to address the complex issues raised by TADs. This broadening of questioning provides a holistic understanding of veterinary public health situations and represents a novel framework, rooted in the implementation of the One Health approach, upon which both my research and teaching activities are based.