

PhD Position in epidemiological modelling in animal metapopulation

PhD proposal (Oct. 2011 – Oct. 2014) : "Spatio-temporal modelling of pathogen spread in a bovine metapopulation: application to bovine viral diarrhoea virus"

The diversity of the cattle farming systems located in a region and of between-farm contacts are major factors influencing the spread, persistence and control of pathogens in a metapopulation of cattle. A modelling approach is adequate to represent such a complex biological system. The objective of the PhD is to model the spread of a pathogen in a metapopulation of cattle to evaluate control strategies at a regional scale relying on the management of between-herd animal movements based on herd epidemiological statuses. The application concerns the spread of the bovine viral diarrhoea virus (BVDV), responsible for large economic losses for farmers. Control programs targeting BVDV between-herd spread have been developed by farmers' organizations in Europe. The ex-ante evaluation of the efficacy of control strategies is therefore a major issue. The PhD student will model BVDV spread in a spatially explicit metapopulation of cattle, characterized by a density of herds of different types interacting via animal movements and neighbouring relationships. The French cattle network first will be described using graph theory. The stochastic dynamic model developed will account for the diversity in within-herd infection dynamics by coupling epidemiological models at the herd scale and a model of pathogen spread on a spatial contact network. The complexity of the resulting model will have to be argued given the relative contribution of between-herd transmission routes to the BVDV regional spread. Model predictions will be compared with the observations performed in North-western France under a range of control strategies.

For further information about this position, contact P. Ezanno (pauline.ezanno@oniris-nantes.fr) and E. Vergu (elisabeta.vergu@jouy.inra.fr). Application letters including a CV, research experience, a short statement of research interests, and contact details of two referees should be sent by email to both contacts. Selection of the PhD student will be done in May-June 2011. The position will start in October 2011.

SKILLS REQUIRED: Is required a master degree with a significant experience in biological system modelling or in biomathematics. Candidatures of students with a master degree in biology / ecology, epidemiology, agronomy, or applied mathematics will also be considered. The ideal candidate will have good computing skills. Proficiency in spoken and written English will be well appreciated.

SALARY: 1370€net per month