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SHORT TERM MISSIONS

Short Term Missions (STMs) are small travel grants with the aim of:

- Sharing scientific expertise, methodologies, equipment and facilities to harmonise the existing approaches and methodologies within the large
- OHEJP European network
  Driving the research forward in a collaborative and non-duplicative fashion to strengthen both the scientific capacity within the OHEJP
- Contributing to the future prevention, preparedness, detection and response of the EU to foodborne and other emerging threats across human-animal-environmental sectors.

Application of spatial models to identify new environmental surveillance indicators of Salmonella and Campylobacter in pig and poultry

"I had the chance to meet a new research centre and to collaborate with and take advice from experts on the field. We obtained results that we could not have obtained working independently. I carried out an important advance in my research project and acquired new skills that we will use in future projects. I would like to highlight that thanks to my short-term mission I pushed my data analysis skills to an upper level."

Antonio Rodríguez
The National Institute for Agricultural and Food Research and Technology
Spain

Theme:	One Health Missions - Skills development missions
Home Institute:	The National Institute for Agricultural and Food Research and Technology (INIA), Spain
Mission Hosting Institute:	National Institute for Public Health and the Environment (RIMV), The Netherlands
Duration of Mission:	1 month

The aim of this mission was to develop a procedure to model surveillance data of zoonotic diseases using machine learning methods. The model was tested on the Wild Boar Surveillance Plan of Andalucía (Spain) data, with the aim to determine the most important risk factors that shape wild boar diseases in Andalucía and study their interaction between each other.

During this mission, the model validation was performed in two main steps. First, a single response variable was selected for the study: the *Salmonella* serology of hunted wild boars. In the first week of the STM, the data was organised in an appropriate way for training machine learning algorithms. Additionally, climate and wild boar distribution information from published maps were collected, to include them as potential drivers of the pathogens. The results being conclusive, a modelling procedure valid for all the wild boar diseases in the dataset was designed. This includes the processing of the dataset before the modelling (pre-processing step), the model application itself and its validation, and the study of the model output. The best way to compensate the unbalance of the positives and negatives in the dataset was explored, to avoid reducing the sensitivity or specificity of the model. A script was prepared to provide several validation statistics based on the comparison between the predictions on the test data and the real positive and negative values. The variable importance was assessed on the training and test data, partial dependence plots based on these data were created and detection of interactions between predictors on the test data was conducted. The developed procedure successfully determined the most important risk factors that shape wild boar diseases in Andalucía and studied their interaction between each other. Using the data from previous hunting seasons, it also allowed to identify areas with higher and lower probabilities of boar disease and to represent the predictions in a map.

The STM has improved on the relationship between two existing One Health EJP partners and enhanced both current and future collaborations between the partner institutes. Additionally, this procedure has been automatised and can be easily applied to the data from the *Salmonella* and *Campylobacter* surveillance in the food chain by the Spanish Agency of Food Security and Nutrition (AESAN) and the *Salmonella* and *Campylobacter* Spanish surveillance plan in poultry farm.

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