EnvDis

D-PhD11-1.2

Responsible Partner: P23 UoS

Contributing partners: PHE

Version 1 (September 2020)

GENERAL INFORMATION

European Joint Programme full title	**Promoting One Health in Europe through joint actions on foodborne zoonoses, antimicrobial resistance and emerging microbiological hazards**
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DOCUMENT MANAGEMENT

Project deliverable	D-PhD11-1.2. Presentation of findings
Project Acronym	PhD11-FBZ4/5- EnvDis
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Other contributors	
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Dissemination level *PU: Public (default)* *CO: confidential, only for members of the consortium (including the Commission Services)*	PU **This is the default setting.** If this project deliverable should be confidential, please add justification here (may be assessed by PMT): ....
Dissemination *Author's suggestion to inform the following possible interested parties.*	OHEJP WP 1 ☐ OHEJP WP 2 ☐ OHEJP WP 3 ☐ OHEJP WP 4 ☐ OHEJP WP 5 ☐ OHEJP WP 6 ☐ OHEJP WP 7 ☐ Project Management Team ☒ Communication Team ☐ Scientific Steering Board ☐ National Stakeholders/Program Owners Committee ☐ EFSA ☐ ECDC ☐ EEA ☐ EMA ☐ FAO ☐ WHO-EU ☐ OIE ☐ Other international stakeholder(s): ..... Social Media: ..... **Other recipient(s):** .....

D-PHD11-1.2

Presentation of findings

1. University of Surrey Conferences

1.1. Veterinary School Research Clebration Event. Short oral presentation. 09/09/20. Online

- Oriented to the wide University community, and more especially to the Veterinary Medicine staff and students.
- Presentation of the mechanistic modelling as the method that will be used to tackle the research questions.
- About 72 attendants.

1.2. Project progress video presentation as part of the vHIVE group (Veterinary Health Innovation Engine) at the 6th One Health Congress. 30/10/2020. Online

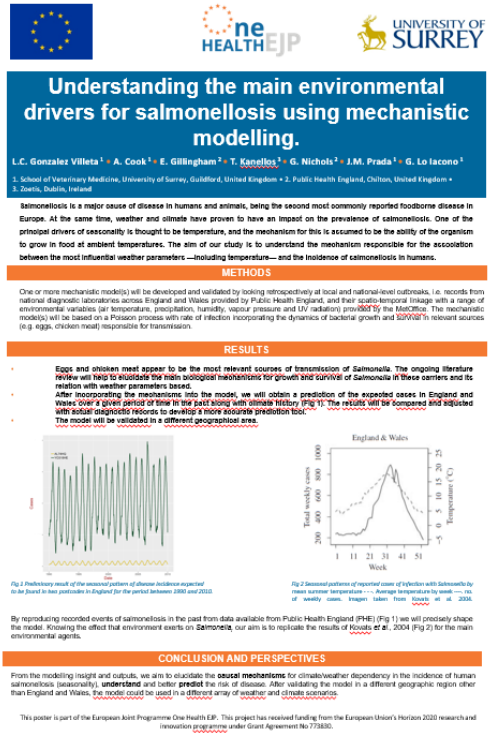
- Oriented to the public interested on the members of the Veterinary Health Innovation Engine (vHIVE) within the 6th World One Health Congress.
- Presentation of PhD project and objectives.
- Over 2,000 attendants.

1.3. Project progress oral presentation at NTD group meeting. 28/09/2020. Online

- Oriented to the Neglected Tropical Diseases Faculty group.
- Presentation of progress open to questions and suggestions within an informal colleagues meeting.
- About 15 attendants

2. OHEJP-related Conferences

2.1. Anual Scientific Meeting 2020. Poster presentation and 3 minute thesis competition. 27-29/05/2020. Online.



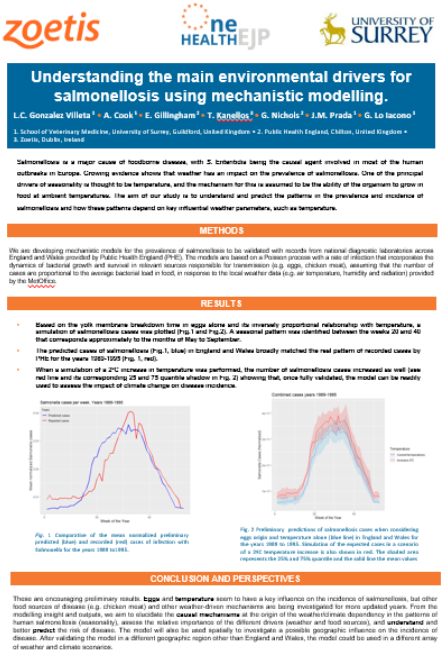
- Oriented to the OHEJP consortium as well as open to the general public interested in One Health-related research (Foodborne zoonoses, antimicrobial diseases and emerging threats).
- Presentation of the research question which takes a look at seasonality as a driver of salmonellosis and research objectives.
- Over 750 participants

2.2. Invited presenter 6th Cogwheel Workshop, 25/11/2020. Online

- OHEJP partner SafeConsume, a research and innovation action funded by Horizon2020 which objective is to reduce health burden from foodborne illness through changing consumer behavior.
- Presentation of preliminary results linking chicken and eggs to salmonellosis.
- About 29 participants

3. External Conferences

3.1. 6th World One Health Congress. Poster presentation. 30/10/2020-03/11/2020. Online



Understanding the main environmental drivers for salmonellosis using mechanistic modelling.

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Salmonellosis is a major cause of foodborne disease, with S. Enteritidis being the causal agent involved in most of the human outbreaks in Europe. Growing evidence shows that weather has an impact on the prevalence of salmonellosis. One of the principal drivers of seasonality is thought to be temperature, and the mechanism for this is assumed to be the ability of the organism to grow in food at ambient temperatures. The aim of our study is to understand and predict the patterns in the prevalence and incidence of salmonellosis and how these patterns depend on key influential weather parameters, such as temperature.

METHODS

We are developing mechanistic models for the prevalence of salmonellosis to be validated with records from national diagnostic laboratories across England and Wales provided by Public Health England (PHE). The models are based on a Poisson process with a rate of infection that incorporates the dynamics of bacterial growth and survival in relevant sources responsible for transmission (e.g. eggs, chicken meat), assuming that the number of cases are proportional to the average bacterial load in food, in response to the local weather data (e.g. air temperature, humidity and radiation) provided by the MetOffice.

RESULTS

- Based on the yolk membrane breakdown time in eggs alone and its inversely proportional relationship with temperature, a simulation of salmonellosis cases was plotted (Fig.1 and Fig.2). A seasonal pattern was identified between the weeks 20 and 40 that corresponds approximately to the months of May to September.
- The predicted cases of salmonellosis (Fig.1, blue) in England and Wales broadly matched the real pattern of recorded cases by PHE for the years 1989-1995 (Fig. 1, red).
- When a simulation of a 2°C increase in temperature was performed, the number of salmonellosis cases increased as well (see red line and its corresponding 25 and 75 quantile shadow in Fig. 2) showing that, once fully validated, the model can be readily used to assess the impact of climate change on diseases incidence.

CONCLUSION AND PERSPECTIVES

These are encouraging preliminary results. **Eggs** and **temperature** seem to have a key influence on the incidence of salmonellosis, but other food sources of disease (e.g. chicken meat) and other weather-driven mechanisms are being investigated for more updated years. From the modelling insight and outputs, we aim to elucidate the **causal mechanisms** at the origin of the weather/climate dependency in the patterns of human salmonellosis (seasonality), assess the relative importance of the different drivers (weather and food sources), and **understand** and better **predict** the risk of disease. The model will also be used spatially to investigate a possible geographic influence on the incidence of disease. After validating the model in a different geographic region other than England and Wales, the model could be used in a different array of weather and climate scenarios.

- Oriented to the world-wide community interested in One Health latest breakthroughs within the 4 main topics: One Health Science, Antimicrobial Resistance, Science-Policy interface and SARS-COV-2.
- Presentation of first modellisation of human salmonellosis based on eggs and temperature, and simulations of disease increase in an ∆2ºC scenario.
- Over 2,000 attendants