Ref: 01/RB
Closing Date: 16.02.26 (close of business)

Project Title: Engineering modified-live virus vaccines to silence immunoregulatory molecules and improve immunity to porcine reproductive and respiratory syndrome viruses

Supervisors: Rory Fortes de Brito and Simon Graham
Research group: Porcine Reproductive and Respiratory Syndrome (PRRS) Immunology

Project Summary:
Porcine reproductive and respiratory syndrome (PRRS) is one of the most economically important diseases affecting the global pig industry. The causative PRRS virus (PRRSV) weakens the immune system allowing it to persist long term and leaving pigs more vulnerable to secondary infections. Current modified live vaccines (MLVs) help reduce the clinical impact of PRRS but offer only partial protection and can still suppress the immune system.

This internship project has two main aims: a) to understand the molecular mechanisms by which PRRSV induces this immunosuppression and b) to genetically engineer PRRSV MLV to express short hairpin RNA (shRNA) or small peptides that silence/block immunosuppressive pathways, thereby triggering stronger, more effective immune responses.

Further Details:
As an intern, you will help identify immunoregulatory genes activated by PRRSV and MLV and to construct and test these new vaccine candidates using cell culture models. Your work will involve:

- Studying how PRRSV infection affects macrophages using quantitative reverse transcriptase PCR and flow cytometry.
- Design and testing of short hairpin RNA molecules targeting and silencing host genes.
- Construction, rescue and characterisation of genetic modified PRRSV MLV.
- Measuring T-cell responses using IFN-γ ELISpot assays.

You will join the PRRS Immunology Group and receive hands-on training from experienced researchers in the relevant techniques such as reverse genetics, cloning, virus titration, cell culture, flow cytometry, western blotting, and ELISpot. This project offers the chance to contribute to meaningful vaccine innovation with potential benefits for animal health worldwide.

References for Suggested Reading:

Lunney JK et al. **Porcine Reproductive and Respiratory Syndrome Virus (PRRSV): Pathogenesis and Interaction with the Immune System**. Annu Rev Anim Biosci. 2016;4:129-54. doi: 10.1146/annurev-animal-022114-111025. Epub 2015 Nov 20. PMID: 26646630.

De Brito et al. **An attenuated herpesvirus vectored vaccine candidate induces T-cell responses against highly conserved porcine reproductive and respiratory syndrome virus M and NSP5 proteins that are unable to control infection**. Front Immunol. 2023 Aug 3;14:1201973. doi: 10.3389/fimmu.2023.1201973. PMID: 37600784; PMCID: PMC10436000.

De Brito et al. **A centralised immunogen approach to develop a more broadly protective modified live porcine reproductive and respiratory syndrome virus 1 vaccine candidate**. NPJ Vaccines. 2025 Jun 21;10(1):129. doi: 10.1038/s41541-025-01192-z. PMID: 40544181; PMCID: PMC12182563.

To Apply: See How to apply. Closing date: 16.02.26 (close of business)