Ref: SGJE.1

Project Title: Evaluation of prototype next-generation porcine reproductive and respiratory syndrome vaccines

Supervisors: Simon Graham & Jane Edwards

Research group: PRRS Immunology

Project Summary:
Porcine reproductive and respiratory syndrome virus (PRRSV) remains one of the most important diseases affecting the global pig industry. Current live attenuated and killed vaccines have only a modest impact. There is therefore an urgent need to develop improved vaccines. Neutralising antibodies can provide immunity against PRRSV. However, PRRSV modulates the neutralising antibody response by focusing the immune response on non-neutralising decoy epitopes and by glycan shielding of neutralising epitopes. There is growing evidence that T cell responses are critical for protection in the absence of neutralising antibodies.

We are exploring two approaches to develop ‘improved’ PRRS vaccines:

1. Enhance the neutralisation antibody responses by genetically engineering PRRSV to remove decoy epitopes and sugars that may shield neutralising epitopes. The aim with this approach is to use this engineered virus as a killed vaccine, which would be safer than a live attenuated vaccine.

2. To avoid the complexity of the antibody response and construct a vaccine to induce T cell-based protection. To do this we will engineer a live attenuated herpesvirus expressing PRRSV antigens known to be targets of T cell responses. The rationale for using a herpesvirus as the vector is that it is known that these viruses naturally stimulate strong T cell responses.

Details:
Depending on progress, the successful student may undertake the following in the duration of the research project:

The evaluation of the two vaccine approaches will involve two proof-of-concept studies to assess the immunogenicity and efficacy of the novel vaccine candidates in pigs. The student will play a key role in these studies. This will involve assessing both antibody (ELISA and virus neutralisation assays) and T cell responses (IFN-gamma ELISpot assay and flow cytometry). As well as assessing protection by measurement of virus loads in secretions, blood and in tissues collected post-mortem by quantitative RT-PCR. In addition to this core suite of assays, there will be scope and time for the student to help shape more in-depth analysis of samples, which will be collected and stored from these studies.

The student will be embedded in the PRRS Immunology Group and will receive support and guidance from the group leader Prof Simon Graham and Dr Jane Edwards. The student will work in partnership with the post-doctoral scientist recruited to work on these projects. Support will be also provided by other postdocs and students in the group.

This exciting new project is well suited to students with interests in immunology, viruses, and vaccines.

References for Suggested Reading:
1. www.pirbright.ac.uk/viruses/prrsv
4. Vu HLX, Pattnaik AK, Osorio FA. Strategies to broaden the cross-protective efficacy of vaccines against porcine reproductive and respiratory syndrome virus. Vet Microbiol. 206:29-34

To Apply:
Please email your CV (no more than two sides of A4) and a covering letter detailing why you would like to undertake the placement and the knowledge and skills that you will bring to the Institute to lucy.drudge@pirbright.ac.uk

Closing date to apply: 01.02.21