PhD Studentship: Disease-resistant livestock: Uncovering the Role of Viral IFN Antagonism on Infectivity using Gene-Editing

Project Ref: 2026/01
Anticipated Start Date: October 2026 **Duration:** 3.5 years full-time
Closing date to apply: 20.03.26

Eligibility:

- This studentship is open to science graduates with, or who anticipate obtaining, at least a 2:1 or equivalent in a relevant biological subject in an undergraduate degree, or with a Masters degree - subject to university regulations**.** Other first degrees, e.g. veterinary science, will be considered. You should be looking for a challenging, interdisciplinary research training environment and have an active interest in the control of infectious diseases.
- This is a 3.5 year fully funded studentship open to UK nationals. International candidates may apply, however funding for this studentship includes university tuition fees at the Home rate only.
- Students without English as a first language must provide evidence that they meet the English language requirement, e.g. with an average IELTS score of 7.0, with no lower than 7.0 in listening/reading and no lower than 6.5 in speaking/writing.

Supervision:

Principal Supervisors: Dr James Kelly (The Pirbright Institute), Dr Finn Grey (The Roslin Institute, University of Edinburgh)
Co-Supervisors: Prof Nicolas Locker (The Pirbright Institute), Dr Eleanor Gaunt (The Roslin Institute, University of Edinburgh)
Research Group: Picornavirus Tropism

Project Details:

Background and Impact
The global pig and cattle industry, worth £700 billion annually, faces persistent threats from viral diseases, particularly Foot-and-Mouth Disease Virus (FMDV). This highly infectious virus causes blisters on the feet and mouths of cloven-hoofed animals such as pigs and cattle, and it also reduces the lifetime productivity of the infected animals. The economic toll of FMDV is staggering; endemic regions incur annual costs of approximately $21 billion, while recent outbreaks in Europe resulted in losses of $1.2 billion.

The Research Challenge
Gene editing (using tools like CRISPR/Cas9) to develop disease-resistant livestock is a potentially game-changing strategy to control viral diseases. However, identifying the right genetic targets is a significant challenge.

Project Aim
This PhD project seeks to identify and understand the specific gene edits that can protect porcine (pig) cells from FMDV infection. Specifically, the research will focus on enhancing the ability of the host's antiviral defence pathways to provide robust protection against FMDV infections.

Project Scope
FMDV is highly adapted to repress the interferon (IFN) response pathway, the host's primary defence against viral infections. This repression is primarily driven by viral proteases L-pro and 3C, which disable the IFN response by cleaving important proteins involved in the pathway. L-pro and 3C recognise highly specific amino acid sequences; even a single amino acid substitution can disrupt protease recognition. By precisely editing these target sequences, we can prevent FMDV from repressing the IFN response, thereby enabling the host's innate immune system to effectively detect and clear the infection. This work could contribute to the creation of an FMDV-resistant pig, which would improve animal health and food security.

Training & Support:

You will receive world-class training in advanced experimental approaches, including:

- Advanced CRISPR-Cas9 techniques to generate targeted gene edits
- Handling high-consequence animal viruses within high-containment SAPO4 facilities
- Molecular biology techniques, including DNA cloning, mutagenesis, PCR, sequencing, gel electrophoresis, and western blotting
- Virology techniques, including virus infection of cells and measurement of virus growth using a live cell imaging system and titrations

Alongside these technical skills, you will also develop transferable expertise in data analysis, communication, project management, and scientific writing. We place a strong emphasis on mentorship, supportive supervision, and career development. You will be encouraged to:

- Publish in high-impact journals
- Present your findings at international conferences
- Build a strong research portfolio for a future career in academia or industry

References for Background Reading:

Idoko-Akoh, A., Goldhill, D.H., Sheppard, C.M. *et al.* (2023) Creating resistance to avian influenza infection through genome editing of the ANP32 gene family. *Nat Commun* 14, 6136

Burkard C, Lillico SG, Reid E, Jackson B, Mileham AJ, et al. (2017) Precision engineering for PRRSV resistance in pigs: Macrophages from genome edited pigs lacking CD163 SRCR5 domain are fully resistant to both PRRSV genotypes while maintaining biological function. PLOS Pathogens 13(2): e1006206.

Feng H, Sander AL, Moreira-Soto A, Yamane D, Drexler JF, Lemon SM. (2019) Hepatovirus 3ABC proteases and evolution of mitochondrial antiviral signaling protein (MAVS). J Hepatol. 71(1):25-34.

Registration, Training and Funding:

This is a Pirbright Institute/University of Edinburgh fully funded studentship. The studentship covers stipend and Home rated university tuition fees. International students will attract tuition fees at the overseas rate and must show evidence of their ability to cover the difference between Home fees and Overseas fees for the duration of study.

The student will be based primarily at The Pirbright Institute and registered with the University of Edinburgh. The student will visit the university to meet with their supervisors and undertake training or complete specific project tasks as required. Eligible students will receive a UKRI-aligned stipend (£20,780 for 2025/26) plus a cost of living allowance of £2,200 per annum. Home rated university tuition fees will be paid. Highly subsidised Pirbright Institute student housing will be offered. A full range of research and transferrable skills training will be made available to the student as appropriate.

Applications:

How to Apply: Closing date: 20.03.26

Essential documents:

- Application Form
- CV
- Two references sent directly by your referees

Please email your application to studentship@pirbright.ac.uk by the closing date.