

Reference: 02/CC

Project: Exploring the environmental survival of Foot-and-mouth disease virus

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Research Group: Transmission Biology

Project Summary:

Foot-and-mouth disease virus (FMDV) can be found in all secretions and excretions of infected animals and the likelihood of environmental contamination during outbreaks is very high. Persistence of FMDV in the environment and on fomites enables transmission routes beyond direct contact between infected and susceptible animals, potentially facilitating much wider spread of the disease if appropriate control measures are not implemented. Previous work at The Pirbright Institute has demonstrated that contaminated environments can serve as efficient routes for the transmission of FMDV.

This project aims to extend this environmental transmission work by assessing the survival of different FMDV strains under controlled laboratory conditions and begin to explore the underlying reasons for these differences. This work will produce data that enables a direct comparison of environmental survival between FMD strains. While a limited amount of survival data is currently available in the FMDV literature, use of diverse methodologies complicates any attempt to make comparisons between strains used in experimental work. The student undertaking this work will learn both cell based and molecular techniques in order to quantify titres of virus with the aim of producing estimates for the survival of different strains of FMDV.

Details:

The initial focus of the project will be to identify differences in environmental survival rates between FMDV strains. All work will be carried out in the high containment laboratories at The Pirbright Institute. Time point sampling and methods to determine titres of live virus will be used in order to produce an estimate for the survival (i.e. decay rate or half-life) of specific strains under defined conditions. Factors known to affect virus survival, such as temperature and pH, will be incorporated into these conditions. Multiple factors play a role in the survival of virus particles in the environment, allowing the student to identify and investigate key factors which could play significant roles for biosecurity and decontamination considerations.

Differences in survival rates between virus strains will be explored, in particular to begin to identify reasons for differences in environmental survival between strains. For example, increased survival rates may involve a trade off with virulence. Cell based assays such as cell killing and competition assays in vitro would be used to enhance the data produced within the project and also provide the student with additional laboratory skills. The student would also have the possibility of assisting with ongoing studies within the Transmission Biology group, such as environmental sampling work during vaccine studies in the isolation units, which would provide further research experience.

References for Suggested Reading:

- Bartley, L. M., C. A. Donnelly, and R. M. Anderson. 2002. "Review of Foot-and Mouth Disease Virus Survival in Animal Excretions and on Fomites." *Veterinary Record* 151 (22): 667–69. doi:10.1136/vr.151.22.667.
- Grubman, Marvin J, and Barry Baxt. 2004. "Foot-and-Mouth Disease." *Clinical Microbiology Reviews* 17 (2): 465–93. doi: 10.1128/CMR.17.2.465-493.2004
- Poulson, R L, S M Tompkins, R D Berghaus, J D Brown, and D E Stallknecht. 2016. "Environmental Stability of Swine and Human Pandemic Influenza Viruses in Water under Variable Conditions of Temperature, Salinity, and pH." *Applied and Environmental Microbiology* 82 (13): 3721–26. doi:10.1128/AEM.00133-16.