openFMD: A data sharing and decision-support portal to enhance genomic and epidemiological surveillance of FMD

WOAH/FAO Foot-and-Mouth Disease Reference Laboratories Network



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Introduction

The rapid and open dissemination of genomic and epidemiological data provide critical support to trace Food and Mouth Disease Virus (FMDV) lineages circulating globally. FMD is an important, high-impact transboundary disease and incursions to free countries occur regularly and potentially from long distances. The global



FMD epidemiological situation is dynamic, and international surveillance and information sharing is crucial to mitigate the risk of introduction and ensure that the vaccine bank holdings reflect the current risks. We present an open-access portal maintained by the FAO World Reference Laboratory for Foot and Mouth Disease Virus (WRLFMD) at the The Pirbright Institute, UK, to support global pathogen surveillance and stimulate the real-time exchange of data between FMD reference laboratories and disease control initiatives. Users can interactively query and visualise historical and recent FMD trends and generate customised epidemiological and genotyping reports through the portal interface.



FMD Analytics

openFMD facilitates the retrivial, analysis and dissemination of FMD surveillance data, including global epidemic intelligence, genome sequences, and disease determinants.

Optimize workflows and reduce analysis time with a variety of workflow automation and secondary analysis solutions.

These tools includes both genetic sequence and epidemiological data, along with associated geographical as well as species-specific data, to help researchers understand how FMD viruses evolve and spread.



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| FMDbase | | FMDtyp | e | | FMDnext | | | More coming so |



Web portal for FMD analytics (to be launched)

Project summary

A dedicated web portal for users offers access to a suite of analytical tools. This include the FMDtype, a genome annotator and genotyping tool which allows user to create customised genotyping reports, including the ability to upload sequences and compare these to VP1 coding sequences held in the FMDbase. The PRAGMATIST¹ tool can be used to prioritise antigens held in vaccine banks for FMD. Vaccine bank holdings may be crucial to enable a swift and effective response to an incursion of FMD into a free country, such as New Zealand, and can also be useful for FMD-endemic countries in planning both preventive and emergency vaccination strategies. The PRAGMATIST tool was developed to support vaccine bank managers in this critical decision-making process, which is likely to have different outcomes depending on the geographical location as well as the ever-changing dynamics of FMD virus circulation in endemic areas. Recent EuFMD funding will see the portal's functionality be further extended with a FMD surveillance and mapping tool currently under development.

The openFMD initiative will not only promote the vital role of the WOAH/FAO Reference Laboratory Network for FMD as leading the global surveillance of FMD, but it will further improve timely analysis and communication of FMD data, identification of surveillance gaps and emerging disease trends to support evidencebased decision-making for FMD control.



Screenshot of PRAGMATIST Tool



¹ Ludi A, McLaws M, Armson B, Clark J, Di Nardo A, Parekh K, Henstock M, Muellner P, Muellner U, Rosso F, Prada J, Horton D, Paton D, Sumption K, King D. PRAGMATIST: A tool to prioritize foot-and-mouth disease virus antigens held in vaccine banks. Frontiers in Veterinary Science, 9. doi: 10.3389/fvets.2022.1029075, 2022.



Mock-up of Mapping Tool (currently in development)