PROGRESS TOWARDS THE DEPLOYMENT OF SIMPLE AND RAPID DIAGNOSTIC TESTS AWAY FROM CENTRALISED LABORATORIES

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“Point-of-care” tests have the potential to revolutionise the way that testing for animal diseases is undertaken by providing results that can be used in real-time to inform disease diagnosis and control programmes. Driven by the demands of human medicine, a wide range of different technology platforms have been invented that can be exploited for livestock diseases. Therefore, access to suitable and robust technologies is no longer regarded as a primary constraint to our ambitions. However, only a limited number of these tests have been currently deployed for routine use in veterinary science, in spite of the large amount of research that has been undertaken to develop assays that might be appropriate for use in these settings.

The role and scope for use of these new tests needs to be defined prior to disease outbreaks and incorporated into contingency plans and decision algorithms. While it is unlikely that initial cases of exotic livestock diseases in a country or region will be designated using tests performed outside of centralised laboratories, mobile and portable tests can potentially play a useful role to assist in local decision-making during an outbreak as well as triage of samples collected from the field. Determination of the sensitivity and specificity of these new tests is important, although much of the published work fails to address how samples will be actually collected and processed in challenging environments where only simple equipment may be available. Furthermore, these studies do not typically consider the training and competency of the personnel who will perform the test, or utilise stabilised reagents with adequate shelf-life that has been formulated for use in the field or in simple laboratories. Development beyond the “proof-of concept” stage is often limited by freedom to exploit intellectual property associated with these new technologies. In view of the expense involved, the final development phase of assays is usually undertaken in partnership between research laboratories and commercial companies. This investment is easier to justify for high-impact diseases such as foot and mouth disease (FMD) where outbreaks are difficult and costly to control. Even so, without coordinated support via national and international “diagnostic banks”, it is questionable whether a sustainable market exists for individual tests due to the sporadic and unpredictable demands of FMD outbreaks. Therefore, it is likely that the more generic platforms that can be applied across a range of exotic (and endemic) pathogens will prove commercially viable in the long-term.

A particular focus has been to generate simple-to-use assays that can be used close to suspect cases of disease to rapidly detect exotic livestock viruses such as FMD virus (FMDV). This work has recently led to the development of a lateral-flow device (LFD) that can detect antigen of all seven serotypes of FMDV. Serotype-specific LFDs, as well as more analytically sensitive molecular formats such as mobile PCR (polymerase chain reaction) and isothermal amplification assays (including NASBA [nucleic acid sequence based amplification], LAMP [loop-mediated isothermal amplification] and RPA [recombinase polymerase amplification]) are also currently under evaluation.