The Xpert ® MTB/RIF Ultra Assay: A Technology for Human Tuberculosis Diagnosis a Solution for Animal TB Diagnosis?

Tiny Hlokwe, Thabiso Nxumalo and Thakgatso Setati. Tuberculosis laboratory, Diagnostic services Programme, ARC-Onderstepoort Veterinary Research, Onderstepoort, Pretoria, South Africa.
Contact: Dr Tiny Hlokwe (Senior Research Scientist); Email: HlokweT@arc.agric.za; Tel: +27 12 529 9149

Introduction

Mycobacterium tuberculosis is the main causative agent of tuberculosis (TB) in human and *Mycobacterium bovis* commonly causes TB in animals. The Xpert ® MTB/RIF Ultra assay is an automated system designed to improve TB diagnosis in humans, but it has never been used for TB diagnosis in animals. Our initial validation of the Xpert ® MTB/RIF Ultra assay on animal tissue, showed sufficient potential for it to be used as a diagnostic tool for TB in animal specimen (Hlokwe et al. 2020).

Project / programme objectives

To further evaluate the diagnostic utility of the Xpert ® MTB/RIF Ultra assay using clinical sample matrices of animal origin other than tissues, for the detection of TB causing bacteria including *M. tuberculosis*, *M. bovis*, *M. orygis*, *M. suricattae* and *M. mongoose*.

Milestones/achievements

In our initial validation studies conducted mainly on tissue samples (n=165) collected from livestock and different wildlife animals, the Xpert ® MTB/RIF Ultra assay was found to have an overall diagnostic sensitivity and specificity of 95.24% and 82% respectively (Hlokwe et al. 2020). This was based on comparative evaluation with culture on solid medium as a gold standard. The Xpert ® MTB/RIF Ultra assay was found to provide rapid results with the result being available within 2 hours (whereas culture may take up to ten weeks to obtain results), allowing rapid diagnosis of bovine TB and early intervention important for control disease purposes. In the current follow up study, we propose to broaden the sample matrix scope by analyzing other routine clinical samples such as blood, bronchoalveolar lavage (BAL), trunk washes, pus, faeces and tracheal fluid.

Conclusions

Initial findings showed that the Xpert ® MTB/RIF Ultra assay has great potential in improving TB diagnosis in animals just as in humans. The successful validation of the system using matrices other than tissue will allow rapid TB diagnosis in animals ante mortem, thus preventing unnecessary slaughtering of suspect animals.

Figure 1: Lung samples submitted for routine tuberculosis (bovine TB) culture (Dr Hlokwe)
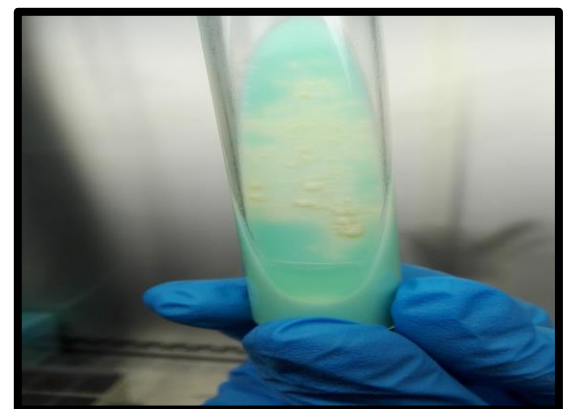

Figure 2: The Xpert ® MTB/RIF Ultra system (Dr Hlokwe)

Figure 3: *M. bovis* on L-J TB Slope (Dr. Hlokwe)

Recommendation

The Xpert ® MTB/RIF Ultra assay has potential to be used as a screening tool to prompt further investigations by regulatory authorities. This will aid in improving surveillance initiatives of the disease in the agricultural sector.

Future Plans

Our future plans include continuous validation of the Xpert ® MTB/RIF Ultra assay on additional sample matrices and the extension of matrix scope of accreditation.

World Organisation for Animal Health
Founded as OIE

ARC • LNR
Excellence in Agricultural Research and Development

BOTSWANA
Our pride, your destination