

Genomic technology provides footrot breakthrough

Footrot in sheep may become a disease of the past thanks to exciting new research developed collaboratively between scientists at Monash University and The Institute for Genomic Research (TIGR) in Maryland, USA.

The highly contagious disease of the feet of sheep causes severe lameness and loss of body condition and is estimated to cost Australian wool and sheep meat farmers up to \$100 million per year. This breakthrough is a key step in the development of a new vaccine against the devastating disease.

The findings, published today in the prestigious journal *Nature Biotechnology*, are the culmination of 8 years of collaborative work on the pathogenic bacterium that causes footrot, *Dichelobacter nodosus*.

The project involved determination of the bacterium's complete DNA sequence, which was then analysed to identify proteins that are potentially exposed on the surface of the causative bacterium and therefore more likely to elicit an immune response.

This approach, called reverse vaccinology, identified eight proteins in the footrot bacterium that are potential antigens for a new cross-protective vaccine.

Dr Ian Paulsen, project leader at TIGR and senior author on the *Nature Biotechnology* paper said: "Determining the genome sequence of *Dichelobacter nodosus* not only provides the basis for vaccine development, but also provides valuable scientific insight as it is the smallest genome of an anaerobic bacterium yet sequenced."

Joint first authors on the *Nature Biotechnology* paper Dr Garry Myers (TIGR) and Dr Dane Parker (Monash University) said the research represented an excellent example of how modern genomic science has the potential to impact primary production.

The Australian research project leader Professor Julian Rood of the Australian Research Council Centre of Excellence in Structural and Functional Microbial Genomics and the Department of Microbiology at Monash University who has been researching footrot for over 25 years said: "We are hopeful this approach will find the 'chink in the armour' to develop a vaccine that will ultimately eliminate, or dramatically reduce, the incidence of footrot."

The reverse vaccinology approach has been made possible by the ARC Centre's microbial gene expression and protein purification pipeline, recently established at Monash University, and by the determination of the genome sequence at The Institute for Genomic Research (TIGR) in Maryland, USA.

The research was funded by the United States Department of Agriculture and the Australian Research Council and involved researchers based at Monash University, TIGR and the University of Arizona.

Professor Rood and his collaborative team have also worked with Professor Richard Whittington, of the Veterinary Science Faculty of the University of Sydney, New South Wales.

If future funding applications are successful the first vaccine sheep trials will be conducted at the end of this year at the University of Sydney's facilities at Camden.