

Epitope mapping of two heartwater proteins – sheep, cattle

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Epitope mapping of two heartwater proteins and identification of vaccine components to be included in the multi-epitope DNA vaccine

Heartwater is caused by the organism *Ehrlichia ruminantium* which is transmitted by ticks of the *Amblyomma* species. It affects mainly domestic and wild ruminants and it is controlled by use of a live blood vaccine. Alternative vaccines are required due to the limitations associated with the current vaccine. At ARC-OVI research towards alternative vaccines has been ongoing and one example is the use of DNA vaccines. Previous studies has shown that the DNA vaccines could offer protection in the laboratory but failed in the field where the disease is transmitted by ticks. In this project we investigated the use of a multi-epitope DNA vaccine which is made up of short sequences from different antigens that were shown to be immunogenic. After three inoculations with the multi-epitope DNA vaccine delivered by i.m. injection and the gene gun, none of the sheep survived challenge with *E. ruminantium* infected ticks. However, when the same multi-epitope DNA vaccine was formulated with an adjuvant, it protected three of the five sheep against tick transmitted *E. ruminantium* infection. From this project we learnt that when using subunit vaccines like DNA vaccines, it is very important to include appropriate adjuvants in the vaccine formulation in order to improve the immunogenicity of the DNA vaccine