*Bos taurus* and *Bos indicus* cattle undergoing infestation with *Rhipicephalus microplus* show different patterns of gene expression and immune reactions

L.A. Jackson[1,5], E.K. Piper[2,5], P.M. Moolhuijzen[3,5], C. Gondro[4,5], M.E. Jones[1,5], S.J Jarrett[1,5], A.E. Lew[1,3,5], and N.N. Jonsson[2,5]

[1]Queensland Department of Primary Industries and Fisheries, Animal Research Institute, Yeerongpilly, Qld, 4105, Australia
[2]School of Veterinary Science, University of Queensland, St Lucia, Qld 4072, Australia
[3]Centre for Comparative Genomics, Murdoch University, South St, Murdoch, WA 6150, Australia
[4]The Institute for Genetics and Bioinformatics (TIGB), University of New England, Armidale, NSW, 2351, Australia
[5]Cooperative Research Centre for Beef Genetic Technologies, Australia

*Rhipicephalus microplus* is a serious external parasite of cattle. Ticks and the diseases that they can transmit are of world-wide economic significance with costs of approximately $US2.5 billion per annum. It is well known that *Bos indicus* cattle develop stronger tick resistance than *Bos taurus* cattle but the basis of this tick resistance is poorly understood. Six *B. taurus* and six *B. indicus* were infested with *R. microplus* larvae for five weeks and tick counts undertaken demonstrated the ability of *Bos indicus* cattle to resist tick infestation. Blood samples were collected after infestation for microarray analysis and immunological testing. Using Affymetrix bovine microarrays, significant differences in the expression of 230 genes were noted. Genes significantly upregulated in the tick resistant *B. indicus* included FOXP1, granzyme B and interleukin-2 receptor alpha (IL-2RA). Quantitative real-time PCR was used to verify differential expression of several genes and validate the results obtained via microarray. Immune assays revealed that peripheral blood of *B. indicus* contained higher percentages of CD4 and CD25 (IL-2R) cells and quantitative real-time PCR revealed higher expression of IL-2, IL-2RA, TNF-alpha and CCR-1. Furthermore, sera of susceptible *B. taurus* cattle had higher levels of tick-specific antibodies measured by ELISA and recognized more tick antigens in immunoblotting. The results suggest that the pathways of tick resistance in resistant *B. indicus* cattle involve immunological processes including activated T cells to enable the ensuing humoral response.