Dr Keith Ballingall

Moredun Research Institute (MRI), Pentlands Science Park, Penicuik, Midlothian, Scotland, UK.

Qualifications

BSc, PhD

Employment history

2004-Present	Principal Scientist, Division of Epidemiology and Population Biology (MRI)
2002-2003	Project Leader/PI, Dept of Veterinary Pathology, University of Edinburgh
2001-2002	Scientific Advisor, Scottish Government, Agriculture and Biological Research Group
1994-2000	Associate Scientist in immunology and vaccine development, International Livestock Research Institute (ILRI), Nairobi, Kenya

Synopsis of current research interests

My research falls within the areas of molecular immunology and immunogenetics with a focus on diversity in livestock genes controlling pathogen recognition and the response to infection and vaccination. Current research is directed towards the development and application of an MHC defined sheep resource flock. The MHC encodes a range of cell surface glycoproteins with central roles in immune surveillance including the presentation of pathogen-derived peptide fragments for recognition by antigen specific T cells, resulting in their clonal expansion and differentiation into effector and memory cells. The MHC includes is the most gene dense and contains the most polymorphic protein-encoding loci in vertebrates with allelic diversity linked to amino acids associated with the binding of peptide antigen. In order to eliminate much of the natural variation at the MHC, a resource flock with well defined MHC haplotypes has been developed. This has a wide range of applications in defining the mechanisms of natural immunity to infection and the identification of pathogen proteins which stimulate protective responses. These may then be fed into the vaccine development pathway. Additional interests are in the genetics of disease resistance and the development of genotyping methodologies. Much of the genotyping data derived from the MHC defined flock has been used to develop the sheep immunopolymorphism database (IPD-MHC) for alleles at loci within the (MHC) of sheep species (http://www.ebi.ac.uk/ipd/mhc/ovar/index.html). I currently chair the International Society for Animal Genetics/International Union of Immunological Societies, Comparative MHC nomenclature committee. The aim of this committee and the IPD databases are to provide a single nomenclature for alleles at polymorphic MHC loci in sheep. Using these databases we can now focus on quantifying current levels of genetic diversity in common and rare sheep breeds in the UK and worldwide with a view to analyzing the links between MHC diversity and resistance and susceptibility to infectious disease and for the development of rational approaches to conservation of genetic diversity in livestock.

Selected Publications

1. Trans-species polymorphism and selection in the MHC class II *DRA* genes of domestic sheep. **Keith T. Ballingall**, Mara S. Rocchi, Declan J. McKeever and Frank Wright, (2010) PLoSONE http://dx.plos.org/10.1371/journal.pone.0011402
2. Sequence based genotyping of the sheep MHC class II *DRB1* locus **Keith T. Ballingall** and Riccardo Tassi (2010) Immunogenetics.
3. Genomic organisation and allelic diversity within coding and non-coding regions of the *Ovar-DRB1* locus **Keith T. Ballingall**, Kathleen Fardoe, Declan J. McKeever, (2008) Immunogenetics, **60**:95-103.
4. Genetic and proteomic analysis of the MHC class I repertoire from four ovine haplotypes. **Keith T. Ballingall**, Despoina Miltiadou, Zhong-Wei Chai, Kevin Mclean, Mara Rocchi, Raja Yaga, Declan J. McKeever (2008) Immunogenetics, **60**:177-184
5. Haplotype characterization of transcribed ovine major histocompatibility complex (MHC) class I genes (2005) Despoina Miltiadou, **Keith T. Ballingall**, Shirley A Ellis, George.C. Russell and

Declan J. McKeever *Immunogenetics*, **57**: 499-509.

6. Bovine leukocyte Antigen Major Histocompatibility Complex class II *DRB3*2703* and *DRB3*1501* alleles are associated with variations in levels of protection against *Theileria parva* challenge following immunisation with the sporozoite p67 antigen**.** (2004). **Keith T. Ballingall**, Anthony luyai, G. John Rowlands, Jill Sales, Anthony J. Musoke, Subash P. Morzaria and Declan J. McKeever. *Infection and Immunity*, **72**: 2738-2741.
7. Cattle MHC: Evolution in action. (1999). Shirley Ellis and **Keith T. Ballingall** *Immunological Reviews*, **167:** 159-168.

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