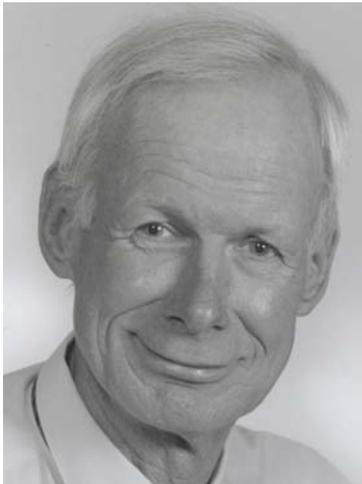

McMEEKAN MEMORIAL AWARD: 2001

*Tom Broad**Allan Crawford*

Drs Tom Broad and Allan Crawford are the co-recipients of the McMeekan Memorial Award in 2001 for their work in creating the Sheep Gene Map. The first comprehensive sheep linkage map was published in 1995, and the third generation map of over 1100 markers is currently in press.

We believe that the internationally recognised contributions of these two scientists in mapping the sheep genome merits a special acknowledgement from New Zealand's animal science community. We also believe that their work will provide the key foundation for much of the future sheep research in the 21st Century. It is for these reasons that we feel the McMeekan Memorial Award by the New Zealand Society of Animal Production is a very appropriate acknowledgement for their endeavours.

Tom Broad was born and raised in Takaka and completed a Veterinary Science degree in Queensland and then worked at Wallaceville on the problem of footrot in sheep. He subsequently received a scholarship and completed a MSc in Biochemistry at Otago followed by a PhD at Cambridge. On his return he was the leader of the Lipid Group at DSIR in Palmerston North investigating the problem of over-fatness in sheep. In 1983 at a key turning point in his career he became the leader of the gene technology program at DSIR, initially in horses and subsequently in sheep. His work concentrated on physical mapping of genes by the use of cell hybrids and *in situ* hybridisation. As part of this work he cytogenetically mapped 75 loci in sheep, most known genes mapped in other species, which allowed comparative linkage between species. One of his students also created a well described sheep-hamster cell hybrid resource. He is a current editor of Sheepbase (a web accessible sheep mapping information resource). He also sits on several international comparative mapping committees, is Secretary of International Society of Animal Genetics (ISAG), and a referee for a number of international genetics and genomics journals. Tom has supervised 2 PhD students and 1 MSc student and is author or co-author of 66 refereed papers, 2 patents and 84 conference proceedings. Tom's current scientific interests are in mapping genes affecting fat and muscling in sheep,

particularly the Carwell muscling gene and another QTL located close to myostatin in sheep, the latter of which was reported to this society last year. However, his major project is an extremely comprehensive reciprocal backcross QTL experiment utilising the lean and fat sheep selection lines at Invermay, which is nearing completion.

Allan Crawford completed a PhD in microbiology at the University of Otago in 1976 and subsequently worked on plant viruses, primarily at DSIR in Auckland. In 1989 he made a major change, when he shifted to Dunedin and commenced work in the AgResearch Molecular Biology Unit at Otago University. He quickly made his mark establishing fingerprinting markers for sheep and published the first paper on a microsatellite in sheep. He specialised in linkage mapping and led a group that identified and mapped approximately 100 microsatellite markers for use in sheep and mapped many cattle markers in sheep as well. The group also created the International Mapping Flock, a full-sib sheep resource, still used extensively world wide for linkage mapping. A microsatellite marker he created was also the first confirmed marker linked to the Booroola gene. During this work Allan has supervised 4 PhD students and has 127 publications and 1 patent. He is also a referee for many journals and is on a number of committees. His current interests include identification of QTL and genes affecting disease resistance particularly those associated with host resistance to internal parasites and tuberculosis. However, he is perhaps best known as the leader of the AgResearch Animal Genomics group, which currently has over 70 staff.

It is very fitting at the dawn of the new century to acknowledge the major contribution that New Zealand has made and continues to make to world research underpinning sheep genomics. As many people are now beginning to realise, genomics is a revolutionary technology that will be a key contributor to the next (industrial) revolution, just as computers are for the current one.

Over the period from 1990 to 2001, 10-15% of the papers published on sheep genomics world-wide have involved New Zealand authors, most of whom have been

associated with either Dr Broad or Dr Crawford. To put this in perspective, over the same period, New Zealand authors have contributed around 5% of sheep related papers and slightly less than 1% of all world agricultural papers. Hence the major contribution of New Zealand scientists to international sheep genomics research is readily apparent. This continues a long tradition of New Zealand scientists being at the forefront of genetics applied to animal production.

The creation and subsequent updating of the sheep map is a major international effort involving many people in a number of different countries. This is a major investment and is fundamental to much current animal research. The two nominees were key instigators of much of this work world-wide. Allan Crawford was the primary author of the first linkage paper in 1995 and both have been co-authors on publications detailing later generations of the map. They have both made a major contribution to this work through their leadership of the Sheep Gene Map programme over recent years, although in reality they have been involved in this work over a much longer period.

Dr Broad headed the physical mapping approach while Dr Crawford did the same for linkage mapping. The two approaches are complementary and together create the Sheep Gene Map. The sheep map is one of the key resources used in systems to identify genes involved in traits of importance in animal production. Both scientists are taking the process further and applying it to the real situation. For example Dr Broad is using the Sheep Gene Map to search for the location of muscling genes in sheep, while Dr Crawford is using a similar approach to search for genes associated with resistance to internal parasites.

Drs Crawford and Broad were part of the team of five awarded a Royal Society science and technology medal in 1995/1996 for this work (the others were Prof Diana Hill, Dr Grant Montgomery and Dr Ken Dodds).

Dr Crawford is currently the Leader of the Animal Genomics programme in AgResearch, and as such is responsible for the leadership of this very wide programme in developing the tools to exploit knowledge of the sheep genome to the benefit of the New Zealand animal industries. Dr Broad has had a key role in ISAG over the last few years and was co-convenor of the highly successful ISAG Conference held in New Zealand in 1998.

Both scientists have extended their contributions to well beyond the limit of sheep genetics. For example, Dr Crawford is involved in the deer tuberculosis research and is also working with the New Zealand dairy industry in developing lower cost technologies for genotyping and applying the knowledge of genomics in a practical situation. Dr Broad has a special role in comparative genomics. This involves the comparison of the different gene maps to identify points of similarity and differences in order to understand evolution and also to assist in mapping genes of sheep by using the maps of much better defined species.

This is the first McMeekan Memorial award to any scientist or scientists in the area of molecular biology,

and this is the discipline, which provides the key tools for genomic technology. This joint award specifically recognises the creation of a vitally important tool in identifying the genes that are important in the productivity, product quality and health of farmed ruminants.

P. F. Fennessy

J. C. McEwan

Presented by W. M. Kain