

McMEEKAN MEMORIAL AWARD 2002:**David Norman Wells**

David Wells is a highly valued Scientist in the Reproductive Technologies Group at AgResearch, Ruakura. He is leader of the Foundation of Research Science and Technology funded NERF objective on cloning of livestock from adult somatic cells which has achieved outstanding results over the last 5 years.

These achievements have been the established lines of differentiated somatic cells from sheep embryos, cattle late-stage embryos (34 days after conception) and adult cattle and the demonstration that these cell lines are totipotent using the technique of nuclear transfer. This involves firstly synchronising the cells into particular stages of the cell cycle, then transferring individual cells into the perivitelline space of eggs which have had their own chromosomes removed, electrically fusing the egg and cell cytoplasm and activating the embryo so that the embryo develops to the blastocyst stage *in vitro*. Blastocysts of suitable quality are then transferred to recipient animals. The resulting offspring are clones of the somatic cell line.

David's work has increased the efficiency of the nuclear transfer procedures leading to an approximately two to five-fold increase in efficiency of producing cattle clones compared to the best overseas groups. This is a very significant achievement, and combining his technology with that of the dairy cattle transgenics programme puts N.Z. at the forefront of international biotechnology research.

These achievements have been recognised by the overseas biotechnology companies, Pharmaceutical Proteins Ltd, UK, and Geron (Clone International), which have established joint ventures in N.Z. with AgResearch in pharmaceutical production from transgenic dairy cattle and animal cloning, respectively.

David has also filed a patent for novel nuclear transfer technology (NZ patent no. 337792).

Both male and female lambs were produced from cultured embryonic cell lines. This was the second report in the world of animals born following nuclear transfer of somatic cells. These lambs have been shown to be fertile. Furthermore, inter-mating of cloned rams and cloned ewes has demonstrated normal sexual reproduction and normal offspring.

Calves from cell lines established from a late stage embryo were the first born in the Southern Hemisphere from somatic cell cloning and the third report in the world of such cloning. Calves from somatic cells derived from adult cattle were the second report in the world (the first report occurring only 6 weeks previously) of animals produced from adult cells. A unique component of this cloning work was that the calves were clones of an Enderby Island cow and demonstrated the potential of the technology for rescuing endangered species. Nineteen calves from somatic cells derived from an adult high-breeding - worth Friesian dairy cow represented the first, largest single group of cloned offspring born from a living animal. These animals (and subsequent offspring) are



monitored for production characteristics as they age. In total, over 70 cloned offspring have been produced following somatic cell nuclear transfer with a variety of different cell lines.

The above achievements are outstanding, especially when it is realised that a small team of people conducted all the laboratory work. This indicates the enthusiasm, dedication and skill of David in his chosen work area.

In his role as head of nuclear transfer research, David has a number of internal AgResearch collaborations. These include a joint project with Dr Phil L'Huillier and Goetz Laible, leaders of the dairy cattle transgenics programme, which has led to a number of births of cloned/transgenic cattle produced from adult cells transformed with bovine genes of commercial importance. Calves born include 11 with overexpression of b and k casein and four transgenic with the human Myelin Basic Protein gene.

A further recent collaboration is with Wayne Hein, Wallaceville, to produce clones of high and low parasite resistant lines of sheep for Imprivo, a company studying immunology of disease resistance.

David also has important international collaborative links with overseas science groups and, as already mentioned, with both PPL Ltd and Geron BioMed, two leading biotechnology companies. He has assisted the Business Group in successfully negotiating exclusive licenses with these companies in Australasia, thereby ensuring the competitiveness of N.Z.'s fledgling biotechnology industries.

David's achievements in somatic cell cloning have been recognised by the international science community through invitations to present his results at four international congresses. In addition, numerous media conferences have been held to announce the results and correspondence has been entered into to describe the technology to the public. This includes discussions with teachers, students, governmental advisory groups, industry groups, general public and assistance with high school textbooks. Other invitations have been to act as a consultant to commercial cloning organisations. David has published/submitted 51 papers, abstracts and general articles over the last 5 years.

In summary, David Wells, has developed world-leading nuclear transfer technology which underpins N.Z.'s entry into the high-value transgenic pharmaceutical/nutraceutical and animal cloning industries. This success, in a very competitive international field, mirrors David's skills at research plus his dedication and enthusiasm for his chosen research field. Seldom does N.Z. produce such an internationally recognised scientist, and for this reason David Norman Wells is an extremely worthy recipient of the McMeekan Award.

*Robin Tervit
John Smith*