Society for Reproduction and Fertility

SRF PUBLIC LECTURE SERIES 2016

SEX IN 3 CITIES

4th February 2016 16.30 hrs	Royal Veterinary College, London
10th February 2016 15.30 hrs	The Roslin Institute, University of Edinburgh
16th February 2016 18.30 hrs	Sutton Bonington Campus, University of Nottingham

ABOUT THE SPEAKER

Professor Graeme Martin
University of Western Australia

Graeme Martin gained his degree in Agricultural Science in 1975 and his PhD in 1983, both from The University of Western Australia (UWA). He then worked for 2 years in France (Institut National de la Recherche Agronomique, Tours) and 3 years in Scotland (Medical Research Council, Edinburgh) before returning to Australia for a joint position in CSIRO and UWA. After moving full-time to the University, he was promoted to Professor (Chair) in 2001. He has spent major periods of sabbatical leave in France, Mexico and the UK (the most recent being in Oxford, 2013-14).

Over 4 decades, his research has focused on brain pathways through which environmental factors influence the reproductive system. He has worked mostly with the sheep, as a model and as an industrial animal, depending on the funding source! However, his biological interests are broad and he has also studied reproduction in birds (especially the emu), marsupials, dogs, cattle, rodents, and, more recently, large endangered African mammals. He has published about 300 refereed papers, has been cited over 5000 times, and has an h-index of 40. He has trained around 40 PhD students to completion.

In addition, Graeme is committed to science communication (peer-to-peer, and to industry and community). He teaches the discipline at undergraduate level and runs postgraduate workshops. His work has been featured at least 200 times in mass media.

Since 2004, he has been broadening the scope of his research and making serious efforts to use science to transform livestock industries and to change our thinking about how we can feed the world without destroying the planet.

A SYNOPSIS

The 3 Ps of Reproduction: Photons, Pheromones and Phood

For about 40 years, I have been wondering about how reproduction is affected by the environment. It's difficult to ask fundamental questions with experiments on people so, in biomedical research, we use animal 'models'. My models include the emu, ostrich, marsupials, domestic dog, African wild dog, rhino, and pygmy hippo. However, in this presentation, I will focus on the humble sheep: its reproductive system is similar to ours, perhaps more than we would like to admit, and it has the added advantage of being an important industrial animal. The sheep brain takes in information about night length (photons), the odours of its flock mates (pheromones), and the availability of phood, and integrates this information with information about its own body status (energy stores; pregnancy; lactation). It then enacts a strategy that has been fine-tuned over evolutionary timescales to maximise reproductive success.

As with most scientific journeys, unexpected discoveries about reproduction in sheep have offered new perspectives about mammalian biology. For example, we used to think that brain cells cannot divide, but now we know that they can do so in response to photons and pheromones from the outside world. We also used to view reproduction as a simple process in which the brain produces a hormone that stimulates the gonad, but now we know that brain-gonad communication is an intricate two-way exchange. Even within the gonad, there's a whole extra suite of communication channels, perhaps the most astonishing involving a massive group of molecules called 'small RNAs' that are produced by DNA and interfere with the control of the cells by the genes. Gone is the simple traditional view that a gene produces RNA that produces a protein.

What are the implications for these discoveries? First, we are increasingly optimistic about the possibility of regenerating and repairing brain tissue. Second, small RNAs offer a whole new suite of possibilities for dealing with problems in our tissues. Third, photons, pheromones and phood have led to new options for 'clean, green and ethical' management of livestock. So, in this one small presentation about reproduction, I offer you three revolutions!