Infertility in cattle

Investigating problems and solutions...

nfertility is a serious problem with common aspects in several species. For example only about 25% of humans and 35% of dairy cows produce live offspring after each insemination, natural or artificial. In cattle, infertility has a major detrimental effect on the efficiency and economics of food production. In humans, assisted reproductive technologies have been developed but the success rates are disappointingly low. The reasons for low fertility relate principally to events prior to insemination (impaired oocyte and/or follicle development) or after insemination (failure of the fertilised oocyte to undergo normal development, increased early embryo mortality and inadequate physiological development of the uterine endometrium). Overcoming these problems requires a greater understanding of the biochemical and cellular processes that drive the co-ordinated physiological regulation of ovarian, oocyte, embryo and uterine function at this important time.

The dairy sector is responsible for over a quarter of all food exports and is a major contributor to the prepared food industry (22% of total exports) in Ireland. The leading problem facing the dairy industry today is the progressing decline in cow fertility. Low fertility results in reduced milk yields, enlarged labour and veterinary costs, increased culling of cows and a resultant loss of income to dairy farmers. Techniques for enhanced reproduction are critical and small improvements in reproduction can have profound positive effects on the efficiency of food animal production. In addition, cattle contribute to climate change and there is pressure to maintain fewer animals while increasing food production.

Enhanced reproductive efficiency in cattle will have positive impacts on the economy, the environment and on society.

To begin to investigate the issues of declining fertility, the Reproductive Biology Research Cluster was formed in 2007 with major funding from Science Foundation Ireland by

University College Dublin and Teagasc (the Irish Agriculture and Food Development Authority). It brings together multidisciplinary scientists, bioengineers and industrial partners to focus on crucial research questions and to foster the development of new fertility technologies. The cluster was awarded a multimillion euro grant and has rapidly grown to over 50 members from diverse research backgrounds. The research programme focuses on the biology of both the peri-ovulatory and post ovulatory events that lead to the establishment of pregnancy in the cow. Low fertility can be caused by a range of different conditions including poor expression and detection of heat, mistiming of insemination, poor egg and embryo quality, and an inadequate uterine environment preventing the establishment of pregnancy.

The vision of this Reproductive Biology Cluster is to carry out high quality, hypothesis-driven research that is focused on understanding the biochemistry of regulation of infertility in dairy cows, generate new knowledge in an area that is of strategic importance to the Irish economy and become a centre of research and training excellence. The research will help discover the cellular and molecular basis for poor fertility and utilise



these findings to develop, in co-operation with our industrial partners, new diagnostic tools and clinical therapies. It is also envisaged that the findings will have direct relevance to the treatment of infertility in other species, including humans.

The Reproductive Biology Research Cluster welcomes further partnerships from both academia and industry.

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