

RESEARCH AIMS TO MAKE CATTLE IVF AFFORDABLE

NEW in vitro fertilisation (IVF) developments could make the process commercially viable and affordable for mainstream UK dairy and beef herd owners in the future, researchers claim.

According to Stuart Mullan from Paragon ET, IVF promises to accelerate the advancement of cattle performance by enabling multiple calves to be bred from genetically elite mothers, without the hormone injections required by the multiple ovulation and embryo transfer (MOET) technique.

Mr Mullan and colleagues at Paragon ET's base in Newbiggin near Penrith are leading the development of IVF in cattle.

The initiative is a five-year grant-aided project with the Technology Strategy Board, whose goal is "to accelerate economic growth by stimulating and supporting business-led innovation". Paragon Veterinary Group is the lead organisation for the project, supported by three consortium members

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The IVF technique involves extraction of eggs directly from a cow's ovaries by keyhole aspiration, called ovum pick-up (OPU). This is followed by in vitro test tube fertilisation, then culture of the embryos for one week before transfer into recipient heifers or cows as surrogate mothers for a normal pregnancy and birth.

OPU collections can be performed weekly and eggs collected from juvenile heifers, non-pregnant cows and pregnant donors during the first trimester. This process is said to produce more potential embryos than the MOET process, which means IVF can offer a very effective choice if MOET has not been successful, or is not appropriate.

The IVF programme's incep-

tion came about as a way to continue breeding from elite cows that would not conceive normally or respond to the MOET techniques the Paragon ET team had been performing for 30 years.

Mr Mullan said: "Ovum pick-up was initially developed so high genetic merit 'no hoper' cows could be brought back into their owners' herd breeding programmes. It soon became clear this technique could quickly become a mainstream component in the cattle breeder's toolbox.

"One early success story involved the donor cow Applevue Rudy Mattia EX97(4), which stopped producing fertile embryos at the age of 12.

"Using the IVF process, the cow is producing pregnancies again at 15. These calves are carried during pregnancy by recipient cows, whose breeding cycles are synchronised precisely with the timing of egg extraction and fertilisation."

He added: "This part of the

IVF process is the same as for MOET recipients and is consequently well proven and understood by specialist cattle vets.

"[We] treat recipient females with a controlled intravaginal drug release device. This releases progesterone at a precise rate, which then passes through the vaginal wall into the bloodstream. Progesterone suppresses the release of other reproductive hormones, thereby suspending the oestrous cycle temporarily."

After the prescribed number of days, removal of the device causes a sharp drop in blood levels of progesterone. This triggers resumption of the oestrus cycle in preparation for transfer of IVF embryos into recipients at the optimum time.

Mr Mullan reported acceptable pregnancy rates in the transfer of fresh IVF embryos to recipients. The main focus of the research team's work is now to concentrate on freezing embryos and to continue improving subsequent preg-

nancy rates. Another focus is to create viable IVF embryos using sexed semen to produce exclusively heifer calves.

Mr Mullan added: "Each OPU egg collection yields six to eight viable eggs. Extracted eggs require a 24-hour period of maturation in a culture medium before fertilisation. Resulting embryos are cultured for six days in a nutrient medium and then ready for implantation in recipient females that have been synchronised in parallel." Mr Mullan reckons approximately 35 per cent of extracted eggs are likely to make viable transferable embryos."

The project is entering the second year, with the ultimate aim to make a commercial cattle IVF service available to owners of dairy and beef herds.

In addition to the core scientific research and development work, investment is also planned for developing facilities and equipment, staffing and training, and ultimately sales and marketing.