



## **HISTORY OF EMBRYO TRANSFER**

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Horse owners, breeding farm managers and veterinarians currently utilizing embryo transfer owe a great deal to the early pioneers in the field of embryo biology. More than 100 years of research, initially performed in species other than the horse, has made equine embryo collection, manipulation and transfer a clinical procedure that is now routinely performed throughout the world. This review is intended to be a tribute to the efforts of our predecessors and a documentation of the milestones in equine embryo transfer.

The first successful production of live young by embryo transfer was performed in rabbits in 1890. Rabbits were used extensively as research models in the field of embryology throughout the end of the 19<sup>th</sup> century and the early decades of the 20<sup>th</sup> century. Successful transfers of rat and mouse embryos were initially performed in the 1930's. Early efforts in embryo biology of large animal species also began in this decade.

The first successful transfer of sheep, pig and cattle embryos was reported in the early 1950's. Surgical transfer of embryos into the uterus of the recipient was the most successful technique used in the early days. Birth of calves and pigs following nonsurgical, transcervical embryo transfer were reported in the 1960's. However, it

was not until the mid-1970's that transcervical embryo transfer replaced surgical embryo transfer as a routine procedure in cattle.

In 1972 researchers reported the birth of live mouse offspring that were derived from embryos that had been frozen, thawed and subsequently transferred. A year later came a report of the first calf born following transfer of a frozen-thawed embryo.

Transport of embryos over long distances was first accomplished in the early 1970's by placing pig and sheep embryos in the oviducts of rabbits, which were used as biological incubators. The 1970's was also an era of micromanipulation and early attempts at in vitro fertilization. The first calf produced from an embryo that had been biopsied and the sex determined from the biopsy specimen was born in 1975. The first calf produced from in vitro fertilization was born in 1981. This was followed by the birth of IVF pigs in 1983 and lambs in 1984. The birth of the lamb 'Dolly', the first animal born following nuclear transfer or cloning, occurred in 1986.

### **Milestones in Equine Embryo Transfer**

- 1974 The first foal produced by embryo transfer was born (Japan)

- 1974 First report of successful superovulation of mares (Wisconsin)
- 1976 Long-distance transport of equine embryos first reported (England)
- 1982 Foal born following transfer of a frozen-thawed embryo (Japan)
- 1984 Production of twins following bisection of an equine embryo (Colorado)
- 1987 Technique for successful cooling of equine embryos reported (Colorado)
- 1988 Birth of first foal following gamete intrafallopian transfer (Colorado)
- 1991 Birth of first foal produced by in vitro fertilization (France)
- 1996 First foal produced from intracytoplasmic sperm injection (Colorado)
- 2002 Report of 2 foals born following transfer of vitrified oocytes (Colorado)
- 2003 Birth of a mule foal produced by cloning (Idaho)
- 2003 Birth of first horse foal produced by cloning (Italy)



**Splitting an embryo**

Concepts and techniques initially developed in other species have been subsequently used by equine reproduction specialists over the decades. The state-of-the-art of equine embryo transfer at the present time includes superovulation, transfer of fresh or cooled-transported embryos and vitrification (ultra-rapid freezing) of embryos. Embryos are also being produced in a limited number of specialized research laboratories and private reproduction centers by oocyte transfer, sperm injection and nuclear transfer.

Basic research fuels advances in applied research and subsequent dispersion of knowledge throughout the equine breeding industry. If you would like to help support research in the area of equine reproduction, please contact the American Quarter Horse Foundation.



**Twin foals from a split embryo**