Western Beef Resource Committee Third Edition

Cattle Producer's Handbook

Reproduction Section 408

Embryo Transfer: A 2010 Perspective

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Background

Embryo transfer (ET) began in 1890 when Walter Heape, a German scientist, successfully transferred two Angora rabbit embryos into a recipient Belgian doe. The first bovine embryo transfer was in 1949, and the first report of a calf resulting from embryo transfer occurred in 1951. Since that humble beginning, millions of cattle embryos have been collected and transferred, currently resulting in the birth of hundreds of thousands of calves throughout the world each year.

The initial driving force of commercial embryo transfer was the introduction of dual-purpose European cattle breeds into the U.S., Australia, and New Zealand during the early to mid 1970s. Embryo transfer eliminated the need to purchase and import breeding stock subject to lengthy and costly quarantine periods. The high demand for embryos resulted in the rapid development of practical methods of superovulation, embryo collection, cryopreservation (freezing), and transfer at reduced costs.

While originally performed solely by surgical methods at central clinics, the development of procedures by which embryos could be non-surgically collected and transferred during the 1970s resulted in a large increase in ET at reduced costs. A second advance, which took place in the 1990s, the "direct" thawing and transfer of frozen embryos, has had a dramatic impact on the ease with which embryo transfer is performed. A third, more recent advance, production of *in vitro* produced (IVP) embryos, has the potential to greatly increase the number of embryos available for transfer. These developments, and many others, have resulted in a technology that now influences, and in the future will continue to affect, a useful role in the production of beef in many countries.

Embryo Transfer—Why?

Embryo transfer offers several advantages for the beef industry. ET can amplify the reproductive rate of valuable females. Without embryo transfer, an outstanding female will have only one calf per year and usually 8 to 10 calves in her lifetime. However, she has thousands of oocytes or "eggs" in her ovaries that have the potential to develop into calves. By subjecting a cow to superovulation and embryo collection, the number of calves produced in a lifetime can be multiplied many fold. As an unusual example, Brigham Young University (BYU) owned a Holstein cow several years ago that was the dam of over 200 calves. Such success, however, is unusual.

Embryo importation/exportation has provided beef producers throughout the world with opportunities to improve the genetic base of their herds, increase variability within the gene pool of a breed, or introduce new breeds into their countries. A big advantage offered by embryo transfer over importation/exportation of semen is that the resultant offspring will be purebred when embryo transfer is employed.

Through oocyte collection and *in vitro* fertilization (so-called *in vitro* production), infertility that is the result of age, disease, or injury can be overcome. However, one must keep in mind that success rates with IVP embryos remains lower than that derived from *in vivo* produced embryos. In addition, genetic infertility should not be propagated.