Embryo Transfer

ET involves the removal of an embryo from a female of superior genetics and the placement of the embryo into the reproductive tract of a female of average genetics.

- **What is the Goal of Embryo Transfer?**

The goal of ET is to obtain the maximum number of genetically superior embryos in a minimum amount of time.

- **Benefits of Embryo Transfer**

Traditionally, cows produce only one calf per year. ET allows the production of many offspring within a year from a single cow.

ET can increase the genetic potential of a herd in a relatively short period of time.

ET can increase milk production in dairy herds.

ET can increase weaning weights in beef and dairy herds.

ET allows other producers to take advantage of superior genetics because frozen embryos can be shipped almost anywhere.

ET preserves superior genetics for future generations due to embryo freezing.

- **Necessary Equipment for Embryo Transfer**

1- Plastic media bag

2- Foley catheter

3- Embryo filter

4- Microscope

5- Straw

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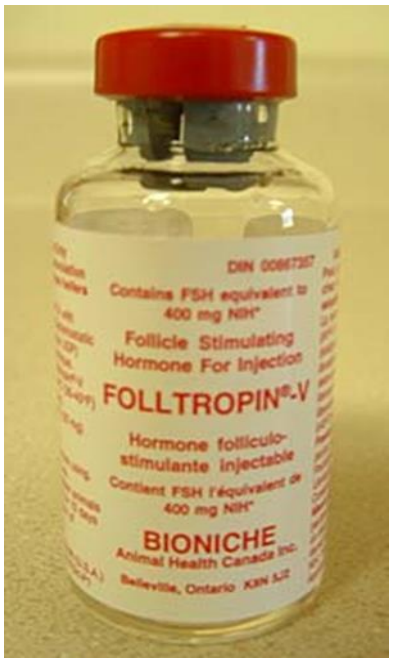
6- Rod

7- Prostaglandin (Lutalyse)



8- Penicillin

9- Lidocaine
10- Plastic Sleeve
11- Bull Semen

- **The Process of Embryo Transfer**

ž ET begins with the selection of a donor cow.

ž The donor cows will contribute the embryos to be transferred.

1- Donor cows have superior characteristics

a) High milking ability

b) High growth rate

c) Outstanding reproductive capacity

2- Bull Selection

Choose bull with superior genetics.

Breeding can occur naturally or by artificial insemination.

3- Recipient Cows

ž Recipient cows serve as surrogate (foster) mothers to the calves, but contribute no genetic information.

ž For this reason, the genetic makeup of the recipient cow is not as important as the makeup of the donor cow.

ž However, the recipient cow must be able to maintain her pregnancy to term and produce an adequate milk supply for her calf.

4- Synchronizing the Estrous Cycle

ž Once the donor and recipient cows have been selected, they must be synchronized so they are on the same phase of their estrous cycle.

ž It is important to synchronize estrous cycles because the reproductive environments of the donor and recipients must be identical in order for the embryo to survive the transfer.

ž The estrous cycle is controlled by the production and secretion of hormones at the proper time during the cycle.

ž Prostaglandin (PGF2α) is the hormone used to synchronize the estrous cycles of the donor and recipient cows.

ž Prostaglandin is produced naturally by the cow. However, a synthetic version called Lutalyse is given in one or two injections to synchronize estrous cycles.

5- Preparing the Donor Cow to be flushed

Before the donor cow is flushed, she is super ovulated with a series of injections of Follicle Stimulating Hormone (FSH). Ovulation is the process of releasing ova. Superovulation causes the ovary to produce many follicles. Follicles are small blister-like structures that develop on the ovary containing one egg each. When the follicles ovulate, the eggs are released. Superovulation ensures that many eggs will be released because there are many follicles present.

6- Breeding the Donor Cow

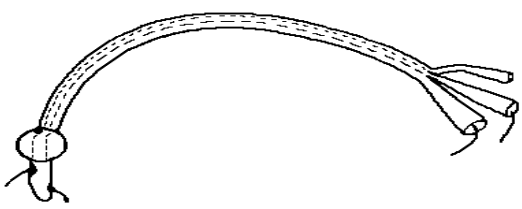
When the donor shows signs of estrus, she is ready to be bred. Some signs of estrus are riding other cows, clear vaginal mucus, and pacing the fence. If using artificial insemination, the donor cow should be bred at least twice to ensure that all eggs are fertilized.

- # The Flush

Once the donor cow has been bred, the embryos are allowed to grow for six days. During this time the embryos also travels down the reproductive tract from the oviduct (the site of fertilization) to the uterus where they can be flushed out. On the seventh day, the embryos are ready to be removed. This process is called flushing. Embryo professionals use a non-surgical method to remove the embryos. An injection of lidocaine is given prior to the flush to reduce pressure and stress on the donor cow and to make the flush easier for the ET, to begin the flush; a catheter is passed through the cervix into one uterine horn. The catheter contains a balloon that is inflated with a saline solution in order to seal the entrance to the uterus so fluid and embryos are not lost.

a) Removing the Embryos

ž The uterine horn is filled with flush media and massaged to allow the embryos to flow out of the tract.



This process is repeated several times in each uterine horn

b) Collecting the Embryos

Embryos are carried out of the reproductive tract through plastic tubes and collected in a filter with the flush media. The pores in the filter are smaller than the embryos so excess fluid drains out of the filter without losing the embryos.

c) Injecting Penicillin

After the embryos have been flushed out, uterus injected with penicillin to kill any missed embryos or infections

d) Embryo Statistics

- An average of 7-10 embryos is collected from each flush. However, the number of embryos obtained from a single flush may range anywhere from 0-60.

e) Separating the Embryos

In the lab, embryos are separated from the flush media and examined under a microscope to determine their quality and stage of development.

- **Transferring the Embryos**

The embryo to be transferred is put into a small, plastic straw and then loaded into an embryo transfer gun.

The embryo is then inserted into either the left or right uterine horn depending on which ovary has a corpus lutuem (CL).

The CL is a structure on the ovary that secretes the hormone progesterone which is needed to maintain the pregnancy.

- **Transfer Immediately or Freeze**

- Embryos should be transferred as soon as possible after the flush (within 8 hours at least). Embryos can also be frozen for later implantation and stored in liquid nitrogen tanks.