

# Embryo Transfer

An embryo being looked at using a stereomicroscope



## with Dr Agustin Ruiz

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**E**mbryo transfer (ET) refers to the removal of an early embryo (seven to eight days old) from the uterus of a valuable donor mare and the transfer of that embryo into the uterus of a recipient mare to complete development, give birth and raise the foal.

- Avoid medical risks associated with pregnancy and parturition for the donor mare
- Embryos can be collected from two-year-old donors, which are too young to carry a foal to term themselves

### Recipient Mares

They represent one of the key aspects of success rates on ET. At least three recipient mares should be available for each donor's reproductive cycle, although it can be done with fewer. Large scale ET facilities commonly offer clients their own recipients selected from a large recipient herd. Any potential recipient will require a full reproductive examination to be considered suitable. Other requirements include an average age of 4-12 years, good overall health, good temperament and ideally have had at least one previous foal. Lastly, recipient mare size must be similar height and build to the embryo donor due to the limiting factor for fetal growth is the size of the uterus and not the genetic of the embryo donor/stallion. The transfer of an embryo into a smaller mare can result in a smaller foal size.

### Advantages of ET

- Mares in competition can donate embryos and remain in performance
- Mares with reproductive problems can donate embryos to reproductive healthy mares. Examples include undiagnosed subfertility; uterine pathologies, older mares (>15 years old) and mares with repeated history of pregnancy loss
- Mares with significant medical or musculoskeletal problems can donate embryos to healthy mares
- Mares that foal late in the season can donate an embryo and still remain open to allow for an early breeding the following year
- Multiple foals per season can be obtained from one donor (with the opportunity to use different stallions). This is regulated by each specific breed association.

### How ET is Performed

- 1 To be able to perform ET, synchronization of the reproductive cycles of both the donor mare and at least two to three recipient (surrogate) mares is mandatory. Proper synchronies ensure that the recipient mare's uterus is at a similar stage as the donor to receive the embryo and carry it to term. This step is crucial in obtaining success in ET.
- 2 The donor mare is bred (natural cover, chill or frozen AI) and her reproductive cycle is followed until ovulation is confirmed.
- 3 Uterine flushing is performed to recover embryo: This procedure is performed between seven and eight days after ovulation has occurred.



The embryo filter

A silicone catheter with an inflatable cuff is used to infuse flushing media (a specifically formulated sterile solution) into the uterus and retrieve it into an embryo filter which will keep the embryo while allowing outflow of the fluid. The flushing is repeated two or three times (with approximately one litre of flushing media at a time).

**4** Search for embryo and prepare for transfer: The embryo filter contents are searched under a special stereomicroscope and the embryo is found, washed at least three times with a holding media (a specially formulated sterile solution to remove cells and detritus) and carefully evaluated under the stereomicroscope to determine stage of development and quality. Only good quality embryos are eligible to be transferred to a recipient.

**5** Embryo is transferred to a recipient: The embryo is loaded in a sterile straw and transcervically transferred into the uterus of a recipient (surrogate) mare to complete development until foaling.

**6** Pregnancy diagnosis is performed five to seven days after transfer with ultrasonography.

### Options on ET

After being recovered from a donor mare, alternatives to immediate transfer are available. Recovered embryos can be prepared for short storage and transport as well as they can be frozen for future use.

#### Short term storage

Embryos can be prepared, and same-day shipped to a different facility to be transferred. This option becomes important when recipient mares are not available at the moment of the embryo collection and a different facility/veterinarian will perform the ET into a previously selected and synchronized recipient.

#### Long term storage

- Embryos can be frozen (process called vitrification) and stored in liquid nitrogen indefinitely. This option provides a great solution to:
- Lack of embryo recipients
  - Inappropriate synchrony between the donor and recipients
  - Embryos collected late in the season (due to competition or late foaling) can be transferred early in the following season
  - Preserve genetics for future use in case of loss of the mare

**"At least three recipient mares should be available for each donor's reproductive cycle."**

### Success Rates

The main factors involved in successfully transferring and obtaining a pregnancy by ET are:

- Timing of A.I
- Synchrony between donor and recipient
- Fertility of the donor
- Fertility of the stallion: stallion fertility is further influenced by semen dose, quality, and method of preservation
- Skill and experience of the veterinarian

Typically, a 70-80% recovery rate (embryos obtained after uterine flushing) are obtained in a young and healthy donor mare with no history of reproductive problems using semen from a fertile stallion (fresh or chilled semen). About 70-80% of those embryos survive in the recipient mare, given an overall success rate of 60-65% per reproductive cycle. This means that it commonly takes two

reproductive cycles to obtain a pregnancy, although it directly depends on the previously listed factors. A reduced embryo recovery rate occurs when aged mares (greater than 15 years), or those with a history of subfertility are used as donors, or when frozen semen is used.

One critical factor in any embryo transfer program lies on the skill and experience of the veterinarian performing the transfer of the embryo.

### Take Home Message

Embryo transfer has become a relatively commonplace procedure in the equine industry. It provides a safe and reliable method of assisted reproduction to valuable mares. To ensure a good and successful experience, always make sure to discuss extensively with your veterinarian and consider all the factors involved in advance. ↻



The flushing system attached to the embryo filter