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Equine Assisted Reproduction Techniques 101

By World Equine Veterinary Association • Oct 05, 2014 • Article #34622



Photo: Courtesy Lauren M. Gallaspy, DVM

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Assisted reproduction techniques (ARTs) are used extensively in today's equine breeding industry. Breeders use ARTs to increase the number of offspring produced by stallions or mares, preserve or move international bloodlines, avoid spreading infectious diseases, allow subfertile subjects to produce offspring, or use stallions and mares as athletes and breeding animals at the same time.

Here, we'll review the four most common ARTs.

Artificial Insemination (AI)

Artificial insemination is the most-used ART in horses and is now approved by all breed registries, except for The Jockey Club. In its infancy breeders used this technique to inseminate mares with fresh semen at the same farm where the stallion stood. The technique was designed to increase offspring produced by a stallion during the breeding season, reduce venereal disease spread, and minimize injury risk in stallions and mares.

Cooled semen was later introduced to reduce costs for mare owners. This technique allows sperm to maintain vitality for 36 to 48 hours by diluting and cooling it at 5°C (41°F), meaning it can be shipped directly to the farm where the mare is kept, eliminating shipping and boarding costs.

Frozen semen was then introduced to preserve genetics for an indefinite time. With this technique, diluted semen is stored in special containers at -196°C (-320°F) and can be thawed to inseminate mares at a later or more convenient time. For example, this year a mare in the United States gave birth to a colt by 1984 Olympic medalist Abdullah. The stallion's semen was frozen in 1989 and inseminated into the 22-year-old mare 14 years after his death.

Frozen semen also allows global marketing of bloodlines, gives breeders the opportunity to produce offspring out of performing stallions, and avoids problems that can arise when using cooled semen (e.g., if a stallion is competing on the day the mare owner orders semen, or the semen shipment is lost or delayed).

It's important to remember that because stallions, regardless of breed, are generally selected for their performance ability and genetics rather than their fertility or semen freezability, not all studs produce semen that cools or freezes well.

Embryo Transfer (ET)

Another widely used ART, embryo transfer, allows veterinarians to transfer embryos from a donor to a recipient mare. The donor mare's uterus is flushed seven to eight days after ovulation to collect the embryo; that embryo is eventually transferred into a recipient mare that will carry the resulting foal to term.

Embryos can also be cooled at 5°C and shipped to a facility where a recipient herd lives. This

allows the donor mare's owner to have a high-quality and receptive (cycling) recipient mare available to him or her as soon as the embryo is ready to be transferred. Breeders use ET to increase the number of foals produced per breeding season by a given mare and to obtain foals from competing or subfertile mares.

Oocyte Transfer (OT)

Oocyte transfer is one of the newer ARTs. With this technique the veterinarian removes a recipient mare's oocyte (egg). Then, he or she places the donor mare's oocyte into the recipient's oviduct, so artificial insemination, fertilization, and embryo development can all occur within the recipient mare's reproductive tract. Oocyte transfer avoids reproductive problems associated with the oviduct, uterus, and cervix, and it can help mares that cannot carry a pregnancy or produce embryos become mothers.

Intracytoplasmic Sperm Injection (ICSI)

Breeders use this advanced reproductive technique on mares that are unable to become pregnant (due to chronic uterine disease, cervical lacerations, or other problems that prevent conception or embryo development) or when pregnancies are sought from limited sperm supplies. It should also be used only on mares that are not suitable candidates for embryo transfer.

With this technique the veterinarian recovers oocytes from donor mares by means of ovum pick-up (OPU). He or she then injects these oocytes with individual fresh, cooled, or frozen sperm and matures the resulting embryos in a laboratory for six to nine days. The veterinarian then either transfers the embryos into a recipient mare or freezes them for later transfer.

Take-Home Message

Assisted reproduction techniques have opened new doors for breeders around the world. These techniques can help spread bloodlines to different geographic areas, allow mares and stallions to compete while producing offspring, help highly sought-after genetics continue after an animal's death, and more.

Seek the advice of a qualified veterinarian before proceeding with any diagnosis, treatment, or therapy.

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