

# Artificial Insemination and Transported Semen

**S**o you would like to breed your mare this year? You have done your "homework" and have located the ideal stallion for your mare. The only problem is that the mare is here in Arizona and the stallion is in Virginia. No problem! You have two options available to you, one send the mare to Virginia or the stallion owner "sends" the stallion's semen via overnight express or aircraft. Transported semen makes it possible to select and breed the finest horses regardless of geographic location. There are restrictions placed on several breeds, therefore, you need to check with your breed registry to determine if transported semen is acceptable. With assistance from your veterinarian, your mare can be bred by the stallion of your choice regardless of his location.

The first step is to determine the health of the mare's reproductive tract. These tests include a uterine culture and a uterine biopsy. The culture examines the uterus for a bacterial infection while the biopsy (a small sample of uterine lining) examines the uterus for chronic inflammation and/or scarring. Once the mare has been established as having a normal reproductive tract, the next step is to determine the mare's heat cycle.

The normal estrous cycle is 21 to 22 days. Estrus (when the mare displays heat signs) lasts 5 to 7 days and diestrus (mare is not receptive to the stallion) lasts 14 to 15 days. During estrus (heat) an egg has been "selected" to mature and be released (ovulated) into the mare's oviduct. Ovulation occurs 24 to 48 hours prior to the end of estrus. The stallion's semen ideally needs to be present prior to ovulation, allowing it to mature in the mare's uterus. Fertilization occurs in the oviduct (fallopian tube) and the embryo moves into the uterus at approximately six days of age.

Now that you have a "quick" view of the mare's heat cycle, we will explain how the veterinarian can manipulate the cycle for optimal breeding.

Three hormones which are frequently utilized to control the mare's estrous cycle are prostaglandin, progesterone and human chorionic gonadotropin (HCG). Prostaglandin and progesterone are naturally occurring compounds in the mare's reproductive tract.

Prostaglandin is released from the mare's uterus when her body determines it is not pregnant. The prostaglandin then works on her ovary to make the cycle repeat itself. Veterinarians frequently administer prostaglandin to shorten the length of diestrus and cause the mare to come back into

heat sooner once the mare has been determined not pregnant. Progesterone is at highest levels during diestrus and is the hormone which maintains pregnancy. This hormone is used to help smooth out erratic heat cycles during the early spring months. Synchronization, or planning the mare's heat cycle, is frequently accomplished through the use of progesterone and prostaglandin. Progesterone is administered orally for 10 days followed by a prostaglandin injection. The third hormone which comes into play is the human chorionic gonadotropin (HCG). This hormone can be used to stimulate ovulation or release of the mature egg. Ovulation usually occurs 36 hours following injection of HCG.

Why all the "fuss" with all these hormones? Why not let the mare cycle on her own? The goal of all of the above hormones is to allow the veterinarian to synchronize the mare and order the semen at the appropriate time. Now that the mare is in heat, the next step is to contact the stallion owner and order the semen. The semen generally needs to be requested a minimum of 24 hours prior to when the mare needs to be inseminated. An example, the veterinarian predicts the mare will ovulate on Thursday or Friday, the veterinarian contacts the stallion owner ideally on Monday or Tuesday. The stallion owner collects the semen on Wednesday and ships it out via overnight express or by an airline. Once the semen arrives at the destination, the veterinarian evaluates it for viability and inseminates the mare.

Now that you know what is required for the mare owner, we should discuss how the stallion owner gets the semen ready.

The facility which is responsible for collecting the stallion should have special lab equipment including containers for semen shipment, an instrument that will quickly and accurately count the number of sperm per milliliter, a good microscope and an incubator. The commercially available container for shipment is produced by Hamilton-Thorn, and is called an "Equitainer." The Equitainer has a precise thickness and a properly insulated core which allows a very specific cooling rate. The design of this container permits the initial cooling rate of the semen to controlled limits and prevents the semen from becoming "too cold." The Equitainer gradually cools the semen to 4 degrees centigrade or 39 degrees Fahrenheit. This temperature can be maintained for approximately 36 to 48 hours if the Equitainer is not opened.

The Densimeter (produced by Animal Reproduction Systems) quickly and accurately estimates the number of spermatozoa per milliliter. This is essential information since each breeding the mare should be inseminated with one billion progressively motile spermatozoa. The Densimeter allows the veterinarian or person handling the stallion to determine how many mares can be bred with each collection (or ejaculate) from the stallion.

The microscope is required to determine the progressive motility of the semen sample. A qualitative estimate is made of the percentage of sperm moving in a forward or progressive manner. This is termed the percent of progressively motile sperm. This calculation is also required to determine the number of sperm needed to inseminate the mare.

Each stallion has to be trained to be collected with an artificial vagina or "A.V." The collection can be performed either utilizing a phantom (breeding dummy) or a mare. Most veterinarians and stallion owners prefer to train the stallions to a phantom. This method is much safer than utilizing a mare.

Each time the stallion is collected the number of sperm and motility must be determined. Once the semen has been collected and analyzed, an "extender" is added to it. Each stallion's semen should be tested with different extenders to determine which extender is best for a particular stallion.

An extender provides the proper balance of ions, minerals, electrolytes, and nutrients to support the sperm cell. It should also have ingredients to minimize damage to the sperm as well as to stabilize the sperm membranes. A good extender will maintain the quality of the spermatozoa for a longer time than they would survive in the seminal plasma. The seminal plasma is the clear fluid that is ejaculated with the sperm.

Once the appropriate extender is selected, the semen should be tested to determine how well it does in an Equitainer. The longer the stallion semen can be stored and retain fertility, the more flexibility stallion owners have in collecting and shipping semen. This flexibility will help the mare owners select a sire and also help synchronize breeding with ovulation.

The final step is to have your mare checked for pregnancy 12 to 15 days following ovulation. Early pregnancy detection is accurately accomplished via ultrasonography. It is important to have your mare checked for pregnancy even if she comes back into heat. Approximately 20% of all mares can have a false heat even though they are pregnant.

Another question mare owners ask is "What are the costs involved in transporting semen?" On the "mare end," the mare owner is responsible for the veterinarian palpating to determine heat and the best time to breed, medications used to bring the mare into heat, uterine cultures and insemination/evaluation of the shipped semen. On the "stal-

lion end," the mare owner is responsible for the breeding fee/booking fee, the veterinarian collecting the stallion, processing and packaging the semen (approximately \$100-200), use of the Equitainer (\$50-60), refundable deposit on the Equitainer (approximately \$250), shipping charge (Federal Express or airlines approximately \$60), the breeding farm transporting the container to the airport and next day return of the Equitainer via Federal Express. These charges are approximate charges and can vary around the country. Remember, even though these charges appear costly, the shipped semen method may still be more economical than sending your mare to the stallion.

Breeding your mare with shipped semen carries approximately a 50% to 70% success rate. The key is having your veterinarian prepare your mare and determine the best time for breeding. □