



EQUIFACTS

Cooled Shipped Horse Semen

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Imagine that you have a really great mare you plan to breed again once she foals. You have recently seen the perfect stallion for this mare at a show in Asheville, North Carolina. Unfortunately, the stallion will be standing this breeding season in California. The expense of shipment and mare care plus concerns for the well-being of the mare and foal make sending the mare to California seem a bad idea. What can you do? Cooled shipped semen may be the answer. With proper management and attention to detail, cooled shipped semen can be used successfully. If either you or the stallion owner try to cut corners, results can be poor.

History of Artificial Insemination (AI)

The first record of successful AI was in 1780 when an Italian scientist named Spallanzani bred a dog with freshly collected semen and later delivered three puppies from that mating. However, there was little selective breeding practiced and no shortage of willing male dogs so little notice was taken of the discovery.

In 1803 Spallanzani placed dog semen in snow and recorded it becoming motionless. Later the semen was warmed, and the sperm began to move again. Early in this century, AI in horses and cows using fresh, diluted semen became widely practiced in Russia and Japan. Fresh, cooled semen saw increased use in cattle in Denmark and the United States in the 1930s. Semen extenders or diluters, which

allowed semen to be cooled and used within 24 hours, were developed. The driving force behind the development of AI was the desire to make wider use of better sires.

Artificial insemination using frozen semen has not enjoyed a lot of acceptance or success in the horse industry. In the early 1980s a commercial shipping container specifically designed for shipping horse semen became available (The Hamilton Equitainer). Since then, a number of disposable shipping containers have become available. The American Quarter Horse Association (AQHA) approved the use of cooled shipped semen in 1997. Given that AQHA is by far the biggest breed registry in the US, their approval of the process will likely be a major boost to the use of cooled shipped semen.

Advantages and Disadvantages of Cooled, Shipped Semen

The advantages of using cooled shipped semen include:

- Location of stallion is of little consequence.
- Avoids the cost, stress and danger of shipment for the mare and foal.
- Avoids mare care costs at breeding facilities.
- Avoids the risk of exposure to contagious disease at the breeding and boarding facility for both mare and foal.

- Increases ability to select stallion with desired pedigree and/or performance traits.

The disadvantages of using of cooled shipped semen include:

- Some stallions having acceptable fertility using fresh semen will not maintain that level of fertility when their semen is cooled and shipped.
- An increased number of sperm are required for good pregnancy rates when compared to AI using fresh semen.
- Mare management must be top notch for an acceptable pregnancy rate.
- Cost for equipment, supplies, semen, semen transport and veterinary costs can offset any savings.

Costs associated with breeding a mare will vary widely but include:

- The cost of collecting, extending and shipping the semen.
- The cost of teasing and/or altering the mare's heat cycle.
- Veterinary costs for palpation or ultrasound exam and breeding.
- Drug costs.

Breed Registry Restrictions and Interstate Shipping Regulations

Not every breed organization allows registry of foals that result from breeding using cooled shipped semen. Always check with your breed registry regarding restrictions on the use of cooled shipped semen.

Interstate shipment regulations do not exist in some instances, are ignored in others, and are enforced in yet others. Generally, it is the responsibility of the shipper to see that any interstate shipment regulations such as health tests are met.

Fertility Results Obtained Using Cooled Shipped Semen

Fertility rates in various research trials and on the farm range from 0 percent to 70 percent pregnancy per heat cycle. This wide variation in results points out the importance of management and quality control in successful breeding using cooled shipped semen. Generally, pregnancy rates for a given stallion

will run 5 percent to 10 percent lower with shipped semen when compared to fresh semen. Remember that not all fertile stallions' semen survive the cooling process well. Before signing a breeding contract, be sure the stallion you select has a history of success in cooled, shipped semen breeding.

Mare Management

All arrangements should be made with the stallion owner prior to the breeding season. Contracts should be signed and a plan of action developed as to when in the breeding season you will attempt to breed your mare. Planning and preparation are key to a successful mating using cooled shipped semen.

Selecting a fertile mare is a good first step in mare management. It's just not a good idea to use a mare with a questionable or unknown breeding history for breeding with cooled shipped semen. The mare should be cycling normally, based on regular teasing, and free of health problems. Vaccinations and dewormings should be current.

In order to achieve an acceptable pregnancy rate (more than 50 percent per cycle), the mare should be bred as near to ovulation as possible. Once the mare is found to be in heat by teasing, the mare should be palpated or examined with ultrasound equipment daily or every other day. Once a follicle is found, its size is monitored until its diameter reaches at least 35 mm. At this point the mare is given an injection of the hormone Human Chorionic gonadatropin (HCG) and the semen is ordered. The injection should result in ovulation in 36 to 48 hours. If the semen is ordered at the time of the HCG injection, it should arrive in about 24 hours or just before ovulation. This is a good time to breed the mare.

Stallion Management

It is important to remember that not all stallions work equally well as producers of semen and not all extenders (diluters) work equally well on all stallions. Successful experience with stallions and extenders is the best way to determine what will or will not work.

Within a few minutes of collection, the semen should be mixed with warm semen extender. A variety of extenders are available but all contain water and nutrients for the sperm cells. Also, chemicals in the extenders keep the acidity of the ejaculate within an

Table 1. Commercially-Available Equine Seminal Extenders and Sources

Product	Antibiotic Choices	Source
E-Z Mixin E-Z Mixin - K	<ul style="list-style-type: none"> • Polymixin B sulfate • Polymixin B sulfate + amikacin sulfate 	Animal Reproduction Systems 14395 Ramona Avenue Chino, CA 91710 (714) 597-4889
Kenney Extender	<ul style="list-style-type: none"> • No antibiotics 	Hamilton-Thorne Research 30A Cherry Hill Drive Danvers, MA 01923 (800) 323-0503
Kenney Extender	<ul style="list-style-type: none"> • No antibiotics • Polymixin B sulfate • Gentamicin sulfate • Potassium penicillin G + amikacin sulfate 	Har-Vet, Inc. 228 South McKay Avenue Spring Valley, WI 54767 (800) 872-7741
Skim Milk Extender	<ul style="list-style-type: none"> • No antibiotics • Gentamicin sulfate • Amikacin sulfate • Ticarcillin 	Lane Manufacturing Co. 2075 South Valentia St. Unit C Denver, CO 80231 (800) 777-2603

acceptable range. Finally, most extenders contain antibiotics to limit the growth of bacteria during storage. A list of sources of horse semen extenders is provided in Table 1.

The volume of extender to be added varies with the number of sperm cells in the ejaculate. Sperm cells can be counted using several systems. This process is best done with each collection but can be done periodically. Semen extenders are added so that the final solution contains 25 to 50 million cells per cc. The percent alive can be estimated using a light microscope.

The number of sperm necessary for acceptable pregnancy is about 500 million live cells. Experience will show what percentage of the stallion's sperm are still alive 24 hours after collection and cooling. Typically, about one-half of a stallion's sperm will still be alive at 24 hours. Therefore, at least one billion cells are shipped in a volume of 20 to 150 cc of extended semen.

An example of the calculations used follows:

- Volume = 50 cc
- Concentration = 150 million/cc
- Percent alive at 24 hours = 50%
- Total sperm = 50 x 150 = 7,500,000,000 cells in 50 cc
- 7,500,000,000) 37,500,000 = 200 cc of extender to add

- Add 200 cc extender = 37,500,000 cells/cc
- Need 500,000,000 alive at 24 hours, so send 1 billion total cells
- 1,000,000,000) 37,500,000 = 26.6 cc.

Calculations often are not done each collection and sending more than the minimum is OK.

Perhaps the most common shipping container used is the Hamilton-Thorne Equitainer. These units cost between \$200-\$300 but are reusable, durable and proven. Disposable shipping containers are less costly (\$25.00) but keep semen at refrigerator temperature for shorter periods of time.

Table 2. Chilled Semen Shipping Containers

Bio-flite	Anaheim, CA 92807	(714) 921-2398
MP & J Associates	Des Moines, IA 54310	(800) 279-7054
Expectafoal	Parker, CO 80134	(303) 341-2268
Hamilton-Thorne Research, Inc.	Beverly, MA	(800) 367-0266
Lane Manufacturing	Denver, CO	(800) 777-2603

Whatever the system used, it is important to follow the manufacturer's instructions. After packaging, the semen is shipped by reputable carrier so that it arrives at the mare's farm in 24 hours.

With cooled semen, Insemination of the mare is generally done immediately after the container is opened. The semen is not warmed before use. Double inseminations at 24-hour intervals don't seem to improve pregnancy rates.

Breeding with cooled shipped semen allows mares to be bred to distant stallions. However, to be successful, attention to detail is a must. There are many ways to do things wrong and only one way to get it right.

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