



# EQUINE REPRODUCTION SVC

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## Determining and enhancing stallion fertility

Afraid your stallion is a dud at stud? Well, don't be so quick to judge: Many factors influence stallion fertility, say our sources, and a good number of these can be managed and improved.

Stallion fertility is important because it means foals on the ground, a successful and profitable breeding operation, and the continuation of a particular stallion's genetics. Stallion subfertility or infertility can have economic consequences in the form of lost breeding fees and increased management and veterinary costs, says Regina M. Turner, VMD, PhD, Dipl. ACT, associate professor of large animal reproduction at the University of Pennsylvania's New Bolton Center.

But keep in mind these rates aren't entirely up to the stallion. To determine his fertility, look at fertile mares he bred under good management conditions, says Terry Blanchard, DVM, Dipl. ACT, professor at Texas A&M University.

"In our studies with Thoroughbred stallions, the mares bred accounted for about half of the variation in pregnancy outcome," he says, noting that management techniques on the farms housing the mares accounted for about 17% of the variation in pregnancy outcome. "Only about a third of variation in pregnancy outcome was due to the —stallion," he explains.

Once you and your veterinarian resolve any problems with the mares, farms, and breeding dates, then assess the stallion. Because there are many causes of subfertility and sterility and not all are identifiable or even known, these problems cannot be solved simply, says Blanchard. And whether a veterinarian can improve a stallion's fertility typically depends on the underlying cause. It is very important that owners of subfertile or infertile stallions have a veterinarian perform a complete breeding soundness evaluation in an attempt to determine the cause of his problem before discussing treatments.

Let's take a look at common causes of subfertility and the methods used to correct or improve it.

### Genetics

Stallions' sperm production and function likely have a genetic basis. If a stallion inherits "good" copies of these genes, then he might have improved fertility compared to other stallions, says Turner. However, if the stallion inherits more than his fair share of "bad" copies of these genes, he will be at an increased risk of possessing fertility problems. She suggests that this is probably why some horse breeds or family lines tend to be more fertile than others.

**Solutions** If the fertility problem is genetic (for example, the stallion has always been subfertile and is from a line of subfertile stallions), then you can't really "treat" the underlying problem, Turner says. "We have no way of replacing 'bad' genes with 'good' genes."

However, in these cases it might be possible to manage the stallion or process the semen to improve pregnancy rates. Basically, she says, you have to make the most of a bad situation.

In some cases when stallion sperm numbers are low and the mare is not being bred using live cover (as is required for certain registered breeds such as Thoroughbreds), a veterinarian might use a procedure called deep horn insemination. With this technique, sperm are concentrated using centrifugation (spinning to separate the light and heavy particulates) and placed deep within one of the mare's uterine horns, next to the ovary that is about to ovulate. Sperm then only have a short distance to travel before they reach the oviduct where they can fertilize released the egg, says Turner, resulting in good pregnancy rates.

In extreme circumstances, or when —using deceased stallion's semen, veterinarians can use a technique known as intracytoplasmic sperm injection (ICSI). Here the veterinarian injects a single sperm directly into an egg aspirated from the mare's ovarian follicle to produce an embryo, which can then be transferred to a recipient mare. Advantages of this technique are that it requires very few sperm, and they don't have to be motile (moving), says Turner. However, the procedure is expensive and offered by few clinics in the United States.

Reducing a stallion's "book" also can help, she says. If a stallion is booked to 80 mares for one breeding season but his sperm counts are low, each mare might receive an inadequate dose of sperm and be less likely to get pregnant. Reducing book size can mean more sperm per insemination and might increase pregnancy rates.

In recent research published in the *Journal of Equine Veterinary Science*, Blanchard suggests collecting dismount semen samples to confirm ejaculation and check sperm motility to monitor changes in fertility during the breeding season.

### Poor-Quality Seminal Plasma

Seminal plasma is fluid from the accessory glands that adds volume to the sperm. Even if a stallion has good semen quality, over time, and perhaps while in storage, his sperm motility can decline rapidly because it is exposed to poor seminal plasma. This results in subfertility.

"The factors responsible for making 'good' and 'bad' seminal plasma have not yet been determined," Turner says. "This is an area of active investigation since, for example, if specific proteins that provide a beneficial effect to sperm could be identified, they might be useful therapeutically to improve the longevity of sperm."

**Solutions** Stallions with poor-quality seminal plasma can benefit from having the plasma removed via centrifuge. During this process the sperm are packed into a soft pellet at the bottom of the centrifuge tube. Most of the seminal plasma can then be aspirated off the top of the pellet, and the sperm can be resuspended in semen extender. This process can vastly improve the longevity of sperm motility as well as pregnancy rates, says Turner.

Stallions with poor sperm quality also might benefit from gradient separation of sperm. In this processing technique, sperm are separated based on buoyancy, or their ability to float. Abnormal sperm have a different buoyancy than normal sperm and can be removed from a sample, resulting in a concentrated sperm pellet. Although a large number of sperm are often lost in the gradient, the resulting high-quality sperm can be very useful when paired with deep horn insemination techniques, says Turner.

### Environment's Effects

Hot weather and toxins or chemicals in the environment can impact sperm production, as well as semen quality and fertility. Anabolic steroid administration is another factor—albeit a management one—in the stallion's environment. These drugs might be administered to enhance some competition horses' performance, but they can reduce fertility.

**Solutions** Breeders should remove or alter any environmental factor contributing to poor testicular function. House the stallion in a cool, comfortable environment, and discontinue any drugs that can adversely affect fertility (such as some anabolic steroids), Turner suggests. This can improve fertility in about 60 days.

### Venereal Disease

Sexually transmitted diseases can affect testicular function. For example, equine herpesvirus-3 can cause lesions on the stallion's penis. Equine viral arteritis causes inflammation in the external male reproductive organs and fever. Any systemic illness that causes fever in a stallion can briefly affect semen quality and fertility. Testicular tumors and reproductive tract infections can cause fertility problems as well.

**Solutions** Many of these problems, with the exception of tumors, are transient. If a veterinarian treats and corrects the problem, fertility usually rebounds, says Turner.

### Age

Testicular function and fertility often decline as a stallion ages. The exact causes of age-related fertility problems are not yet known, says Turner. However, the problems are associated with a progressive decrease in testicular size and a decline in semen quality.

**Solutions** Unfortunately, there is no known treatment for old age, says Turner, but—perhaps only half jokingly—her lab is working on it. "We have evidence that there are cells or factors in young testicles that can help the function of aged testicles," she explains. "Some day we hope to be able to identify these cells or factors and use them to develop a treatment for age-related declines in fertility."

### Sperm Delivery

Some subfertile stallions have normal testicular function and semen quality but have trouble delivering the sperm to the mare, explains Turner. These problems can be caused by blockages within the reproductive tract that prevent ejaculation.

**Solutions** A veterinarian can clear sperm blockages using a combination of physical massage of the blockage—usually through the rectum—and very frequent semen collections to clear the obstruction.

### Pain

Some stallions might have back pain, or even a fractured pelvis, that makes it painful to mount a mare and/or ejaculate. These stallions might show signs of discomfort in the breeding shed. If breeding is associated with chronic pain, the stallion's libido might eventually decline, further complicating the problem.

**Solutions** Have a veterinarian perform a careful musculoskeletal and behavioral examination on these stallions to identify the source of the pain. Then he or she can prescribe appropriate treatment, such as non-steroidal anti-inflammatory drugs. Some stallions can be trained to ejaculate while thrusting with all four legs on the ground, which can minimize back pain. There are also some drugs, such as xylazine, that when administered at the appropriate dosage can result in spontaneous ejaculation in about 30-40% of attempts, says Turner.

### Nutrition

Although specific nutritional deficiencies can, in theory, result in subfertility, Turner says, these problems are rarely seen today. Why? Because the vast majority of nutrition programs are more than adequate to support normal fertility. Instead, the most common nutritional problem now seen in breeding stallions is obesity.

**Solution** Overfeeding and inactivity create overly fat stallions that are at increased risk for developing joint and back problems and, eventually, problems such as equine metabolic syndrome. These can all lead to physical problems with breeding. Turner suggests keeping stallions on a maintenance diet and providing regular exercise.

Some stallions might benefit from omega-3 fatty acid supplementation. Omega-3s have been shown to improve motility in stallions with poor longevity of sperm motility when sperm are cooled in an Equitainer (used to transport cooled semen). Such supplementation is not a panacea for all causes of infertility, Turner says, but it might benefit select stallions.

### Take-Home Message

Before making a judgment about a stallion's fertility, assess the whole picture. Look at the mares he's breeding, the environments where mare and stallion are kept, and have a veterinarian perform a complete breeding soundness examination annually. Correct any problems discovered and then reevaluate his fertility.