

Increasing Stallion Fertility

There are a couple of things you can do to help a stallion whose semen quality is less than ideal.

By Stacy Pigott

Most of the time, Mother Nature does a great job of managing the equine breeding season. Mares cycle and ovulate on a set schedule, allowing veterinarians and stallion managers to plan accordingly. When a mare is difficult to get in foal, there are a multitude of things that can be done to help Mother Nature along. But sometimes, the problem isn't the mare. Sometimes, a stallion's semen quality is poor enough to cause issues settling mares. When that happens, there are some things you can do to give Mother Nature a helping hand.

Evaluating quality

Before each breeding season starts, beginning in October or November, stallions should be collected several times and have their semen evaluated. The first couple of collections are discarded as they don't generally yield any useful data.

"We call that the clean-out collection,"

said Dr. Chelsea Makloski-Cohorn, a veterinarian at Pinnacle Equine Veterinary Services PLLC in Whitesboro, Texas. "Generally you collect them a few times, get them cleaned out, and then you can start evaluating what the semen truly is like.

"We start testing a stallion's semen in October and November," she continued. "You don't want to do it too early in the fall, because the sperm cells a stallion is ejaculating today were actually starting to be made about 60 days ago in the heat of the summer. You really want to wait until the cooler part of the year to start looking at that ejaculate and seeing what the sperm quality is."

The two main criteria veterinarians use to evaluate semen quality are concentration and progressive motility.

Concentration refers to the number of sperm cells per milliliter (mL) of ejaculate. It is determined by counting the number of sperm using a microscope. Generally speaking, a higher concentra-

tion of sperm cells is preferred.

Progressive motility evaluates the type and amount of sperm movement. A progressively motile sperm will swim forward in an essentially straight line, while a non-progressively motile sperm swims, but with an abnormal path, such as in circles.

"We're really concerned with progressive motility," Makloski-Cohorn said. "If those sperm cells are moving across a slide [under a microscope], they can get to their destination. If they're just kind of wiggling, they might not make it to the site of fertilization."

The Colorado State University (CSU) hypertext "Pathophysiology of the Reproductive System," recommends that stallions have progressive motility of 60 percent or greater to pass a routine breeding soundness exam.

Progressive motility, combined with concentration, will help determine how many mares a stallion can breed. A stallion with low concentration or low pro-

gressive motility won't be able to breed as many mares, and his semen may not cool or freeze well enough to ship off site.

In addition to concentration and progressive motility, morphology is another indicator of semen quality. Morphology refers to the quality of the individual spermatozoa. Physical defects of the head, midpiece or tail are noted and counted. According to CSU's hypertext, some sperm from an ejaculate will always be morphologically abnormal, but when that percentage becomes excessive, fertility may decline.

If a stallion's concentration, progressive motility or morphology are low, his semen is considered poor quality, and he likely won't be able to settle many mares. Advances in equine reproduction technology, however, have given stallions with poor-quality semen a second chance in the breeding shed.

Centrifugation

One method used to help stallions with low concentration is centrifugation, which is the process of separating the components of a stallion's ejaculate. A centrifuge is used to force the more-dense components of an ejaculate to the bottom of a test tube, while the less-dense components migrate to the top.

"Historically, semen centrifugation has been used to concentrate sperm cells and remove seminal plasma for cryopreservation [freezing] of stallion semen," said Jeff Oswood, of Oswood Stallion Station. "This technique can also be used when the semen concentration in the raw ejaculate is low and coupled with high volume, making it difficult to process a suitable dose for insemination."

After determining the concentration in a particular ejaculate, the semen is mixed with an extender and then centrifuged. Through centrifugal force, spermatozoa are concentrated at the bottom of the tube, with a recovery rate of approximately 75 percent. Recent research at Texas A&M University has shown spermatozoa recovery rates of greater than 90 percent when using an extender plus a cushion media, which protects sperm, to some extent, during the centrifugation process.

Centrifugation is also used to help stallions with low longevity. Ironically, seminal plasma is toxic to all sperm over a long period; however, the negative effects are greater in some stallions than others.

If semen is to be cooled and shipped, longevity is of vital importance.

"Another common reason for semen centrifugation is to remove seminal plasma, which can be harmful to sperm cells," Oswood said. "It really helps when the seminal plasma is detrimental to the longevity of the ejaculate."

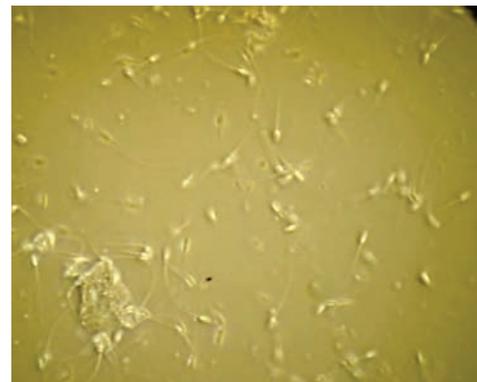
Centrifugation can help stallions with low-quality semen due to concentration or longevity issues, and is often used when breeding mares via low-dose, deep-horn insemination. What it cannot help stallions with, however, are progressive motility or spermatozoa integrity problems. That's where semen purification comes into play.

Semen purification

When technicians at Oswood's breeding laboratory run into a stallion with progressive motility or integrity issues, they turn to semen purification using EquiPure.

"EquiPure acts as a filter during centrifugation that does not allow the less-dense, abnormal spermatozoa to pass through," said Oswood. "EquiPure is designed to increase the quality and viability of an equine semen sample."

Oswood finds EquiPure to be most



Phase contrast microscopy is commonly used to evaluate semen motility. This photo is an example of diluted stallion semen to evaluate motility. —Courtesy of Dr. Chelsea Makloski-Cohorn

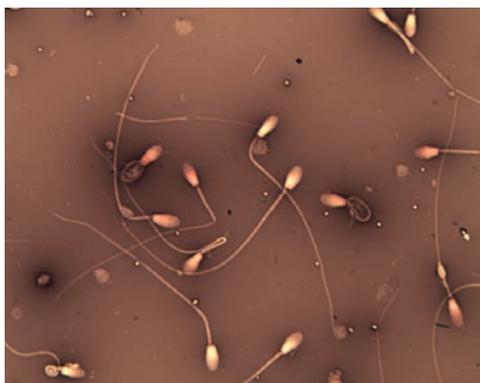
helpful in stallions with low concentration, low motility and a less-than-ideal number of viable cells. Primarily, he sees those problems in older stallions, whose fertility has decreased with age.

"This process doesn't allow you to improve the individual cells, but like any other procedure to improve semen quality, it allows you to concentrate the viable spermatozoa. There is no procedure at this time that can improve abnormal or damaged cells."

Makloski-Cohorn also uses semen



A stallion who is willing and able to perform in the breeding shed may still need some help in the laboratory. —Courtesy of Dr. Chelsea Makloski-Cohorn



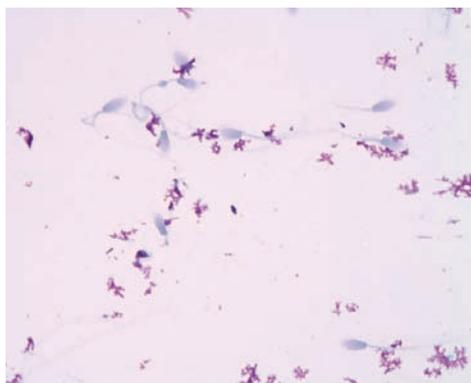
This stallion's sperm cells have several abnormalities ranging from detached heads, coiled and bent tails, proximal droplets and mid-piece abnormalities. In addition, there is a lot of "debris" in the background. This debris can be better analyzed with a different type of stain that may lead to a more distinct diagnosis. —*Courtesy of Dr. Chelsea Makloski-Cohorn*

purification to help prevent the spread of sexually transmitted diseases, such as piroplasmosis. The American Association of Equine Practitioners calls piroplasmosis a blood-borne disease primarily transmitted to horses by ticks and spread from animal to animal by contaminated needles. It can also be spread from stallion to mare through blood in the semen during the breeding process. As it becomes more common, many states, breed associations and equine events require negative piroplasmosis tests.

"Generally it's a blood contamination that transfers that to a mare. It's not common, but it can happen. If they do have piroplasmosis, there is purifying we do on that semen and that makes it a lot safer," said Makloski-Cohorn, who has successfully bred mares with purified semen from piroplasmosis-positive stallions without infecting the mare. "When you're doing the purification process, you're taking out the abnormal sperm cells and leaving the normal sperm cells, but it also takes out the red blood cells that could be carrying that disease. So you're filtering out that disease and purifying that semen."

The positive results of semen purification might leave one asking why it isn't used for every breeding stallion. The answer, said Oswood, relates to time, money and the loss of viable semen.

"It takes about an hour and a half to process semen through EquiPure," Oswood said. "EquiPure and the other



A second stain of the same semen sample accentuates the background debris and reveals large quantities of bacteria and mucous. This particular stallion may have an infection. Further diagnostics would be necessary to confirm these findings and determine a treatment plan. —*Courtesy of Dr. Chelsea Makloski-Cohorn*

equipment needed to perform this procedure are expensive. Also, each time semen is centrifuged, there is a small percent of viable semen that is lost in the process."

Because it is a relatively new procedure, the costs of semen purification could come down as the technology is fine tuned and becomes more main-



These two products – EquiPure and CushionFluid – represent recent advances in the quest to improve semen quality in stallions with low concentration, progressive motility and integrity. Both are used with a centrifuge machine to process stallion semen prior to breeding mares. —*Courtesy of Oswood Stallion Station*

stream.

Nothing, at this time, can help the stallion who has already gone sterile. But thanks to breeding technologies such as centrifugation and semen purification, it's possible to give Mother Nature a helping hand when low-quality semen is the only thing keeping a mare from successfully getting in foal. ★

About the experts

Oswood Stallion Station Inc. finalized the construction of a state-of-the-art semen collection and freezing laboratory (pictured at right) in November of 2013. The 3,000-square-foot laboratory offers multiple appealing amenities to the daily collecting, processing, freezing, packaging, and shipping of equine semen. By continuing to stay current with semen manipulation protocols such as centrifugation and EquiPure, the staff at Oswood Stallion Station is able to offer the best finalized semen product possible to the customer. The vision of Jeff Oswood when building this new laboratory was to not only provide his stallion owners with the best opportunity for their stallion's reproductive success, but also offer those services to outside stallion owners interested in beginning their stallions' careers, or preserving the legacy their stallions will eventually leave behind.

Chelsea Makloski-Cohorn, DVM, MS, DACT, works at Pinnacle Equine Veterinary Services PLLC, in Whitesboro, Texas, offering services such as embryo transfers, artificial insemination with fresh and frozen semen, problem mare breeding management, mare and stallion management, semen collection, freezing and shipping, general health and sports medicine. A native of Colorado, Makloski-Cohorn graduated from Oklahoma State University's veterinary program in 2006.



—*Courtesy of Oswood Stallion Station*



—*Courtesy of Dr. Chelsea Makloski-Cohorn*