

SEMEN COLLECTION *Basics*

A behind-the-scenes look at
the semen-collection process.

BY JAMI STUMP



JAMI STUMP PHOTOS

The world of Angus genetics is a candy store for producers hungry for herd improvement. Different types of genetic “treats” fill the shelves, ensuring that each customer will find a buy to fit his unique needs and desires. The opportunities are endless if you take the time to do a little research and identify the needs of your herd.

What one process has created this candy store? It’s the ability for breeders to collect, sell and purchase the semen of desirable bulls. The semen-collection process performed by bull studs is methodical and exact, resulting in a high-quality finished product that encourages breeders’ confidence.

■ Benefits of collecting semen

Angus breeders have numerous reasons to collect semen on promising herd sires. No. 1 is to serve as insurance against the loss of a bull. Other reasons include increased planned matings, reduced risk of disease introduction or spread, and possible semen sales.

Bill Davis, manager of Rollin’ Rock in Sidney, Mont., collects semen on his bulls for all of those reasons.

“Once you get semen in the

bank, you are guaranteed that you will be able to use that bull’s genetics in the future,” says Davis. “Although genetics do keep moving forward, we believe in planned matings and stacking up the performance of our cattle. For that reason we return to top bulls.”

■ The process

Effective semen collection involves several steps that are overseen by Certified Semen Services (CSS). CSS provides minimum standards for the health and disease prevention



An artificial vagina is used to collect the bull's semen when false mounting. Its cone consists of a rigid rubber casing or hose fitted with a rough-textured inner liner. The semen is funneled into a plastic tube that is attached to the end of the cone.



When age or the health of a bull does not allow him to false mount, an electroejaculator is used. However, using the artificial vagina is cleaner and more labor-efficient than using the electroejaculator.



Certified Semen Sales (CSS) requires that all semen is checked under a microscope for debris, semen morphology or abnormalities, and motility. The semen must meet strict standards before being frozen.

of bulls at entry, during isolation and throughout residency. The goal is to protect the health of the herds in which the semen will be used.

"CSS is an industry quality-control system," says Jere Mitchell, CSS service director. "The participants in our program represent 97% of the semen produced in the U.S. We audit participants to ensure that they are producing a safe product for the end user." CSS is concerned with accurate bull and semen identification throughout the entire collection process.

The actual collection process begins with the aid of a device called an artificial vagina. Duaine Sherwood, barn manager and collector at the Kansas Artificial Breeding Service Unit (KABSU), says the artificial vagina's cone segment consists of a rigid rubber casing or hose fitted with a rough-textured inner liner that is lubricated. A funnel with a plastic tube on the end is attached to the cone. Water is put between the rubber outer casing and the lubricated inner layer.

"Water helps better simulate the pressure and temperature that would be felt inside the cow," says Sherwood. "The water is kept around 110 degrees [F]."

The inner liner is rolled back over the outer cone and secured with a rubber band. Sherwood says this ensures that no water will be displaced and mixed with the semen during the collection process.

■ Collection

To collect the semen, the bull is encouraged to "false mount" a steer. Collection facilities will bring a haltered steer into the bull's pen. They allow the bull to rub up next to and jump the steer twice without ejaculation. On the third mount, when the bull's penis is extended, the

artificial vagina is used. The collector guides the penis to the side by grasping the sheath.

"We don't guide the penis and force it into the artificial vagina. We just move it to the side by pulling it by the sheath," said Sherwood. "The bull will naturally thrust into the artificial vagina like he is servicing a cow."

The other means by which semen can be collected is by using an electroejaculator. Mel DeJarnette, Select Sires reproduction specialist, stresses that the electroejaculator should be used only when the bull will not false mount.

"Health reasons or old age might cause the bull not to be able to mount," says DeJarnette. "Electroejaculation results are variable. The quantity and quality of the semen is not as good, resulting in lower concentrations because there is a lot of seminal fluids."

The artificial vagina, in comparison to electroejaculation, is cleaner and more labor efficient, adds DeJarnette. When collecting 80 bulls a day, using the electroejaculation method takes too much time.

At most large bull studs, bulls are collected twice a day. The amount of semen collected varies between 6 and 12 milliliters (mL) per ejaculate, says DeJarnette. "The second ejaculate of the day is a lot less than the first, especially when looking at the concentration of cells per milliliter."

Body condition and the bull's routine also play a role in semen quality, concentration and volume. It is recommended that bulls be in pasture condition and in the routine of servicing. If bulls are stagnate, the first collections may need to be discarded due to poor quality and abnormalities.

Costs for the actual collection average \$5 for boarding the animal on a daily



Staws of semen are kept frozen in large liquid-nitrogen-filled tanks until purchased for use. Collection facilities will normally store semen, on average, three or four years before it is used up, sold or thrown out at the owner's request.



Double-walled, liquid-nitrogen tanks can be purchased by breeders to store semen. These tanks should be checked every 15 weeks for nitrogen levels. The nitrogen level in the tank should never get below two-thirds of an inch.

basis. Bull-collection facilities will also charge a collection fee per semen straw, normally \$1-\$2/straw. Veterinary bills for health evaluations are normally incurred.

Most bull studs offer on-farm collection. This is an option when wanting to collect small amounts of semen (100 straws), but there are some negatives. These include temperature variation due to poor environmental and facility conditions and health testing of bulls. Cold and heat stress will kill the sperm when semen is not handled properly.

"We have done some on-the-farm collecting, but I prefer to go to a facility, because they have so much more control," says Davis. "You are able to get the bulls health-tested, plus you have the added breeder traffic."

■ Processing

Once the semen is collected, CSS procedure calls for evaluating the semen for debris. Antibiotics are then added, such as gentamicin sulfate, tylosin and lincomycin hydrochloride, and spectinomycin. CSS uses those antibiotics to effectively control the microbiological organisms, mycoplasmas, ureaplasmas, *Haemophilus*

somnus and *Campylobacter fetus* subspecies *venerealis*.

Samples are then taken from the semen mixture and evaluated under a microscope.

"We look for abnormalities under the microscope," says DeJarnette. "We like to see the [sperm] be at least 65% mobile, although most bulls [rate] 75% or better in mobility. We throw away whatever doesn't meet our standards."

Motility is expressed as the percentage of cells that are motile under their own power. To be motile a sperm should be moving or progressing from one point to another in a relatively straight line. The subjective measurement of the motility of a semen ejaculate can range from 0% to 80%.

A morphology evaluation of the sperm cells is also done to identify abnormalities. Fertility of a bull is usually not affected until abnormal sperm exceeds 20%.

Next, extenders are added to the semen, which is then cooled to less than 40° F. Glycerol is added, which allows the semen to freeze.

Unique semen straws are printed for each bull collected. Depending on the semen-collection organization, the

straw may include the bull's code number, stud code number, bull's registration number, date of collection, breed code and ejaculation number.

"The process of printing and filling the straws is checked repeatedly by at least two different people," says DeJarnette.

The semen is then frozen. Most semen organizations test frozen semen after a set amount of time.

"After the semen is frozen for a day, we thaw it out and evaluate it," says DeJarnette. "Some raw semen may look fine but can't withstand being frozen. We want to ensure that the finished product is of good quality and that the membrane integrity of the semen stays intact."

Once frozen, semen can be stored indefinitely in liquid nitrogen tanks at -320° F. Collection facilities can store the semen in large canisters until purchased by a breeder.

Lloyd Jungmann, owner and manager of Hawkeye Breeders Service, currently stores 3.5 million units of semen.

"On average, a breeder will store semen around three or four years," estimates

Jungmann. "At the end of three years the semen is normally used up, sold or thrown out."

Facilities like Hawkeye and KABSU will charge between 30¢ and 75¢/straw for one storage year.

Once semen is purchased by a breeder, it is transferred into double-walled, liquid nitrogen tanks.

"Tanks should be on a 15-week check to ensure that they are full," suggests Sherwood. Breeders shouldn't forget that nitrogen will decrease with use. If levels get too low, the quality and fertility of the semen will be effected. For that reason, Sherwood emphasizes that you don't want the nitrogen level to go below two-thirds of an inch.

To purchase semen, breeders have two options. They can either call the owner and breeder of the bull or, if they know the collection facility that has the semen, they can contact the bull stud directly. 