AI Basics

Artificial insemination is becoming a more prevalent tool for gaining access to elite genetics and for custom-matching sires and dams to reach genetic goals more rapidly.

BY JAMI STUMP

We all want the opportunity to breed our females to a superior, proven Angus sire; but, for most of us, our pocketbooks wouldn't allow us to own him. One solution to gaining access to these elite genetics is artificial insemination (AI).

It's probably safe to say one bull won't be the ideal match for every female in your herd. AI affords you flexibility in your genetic selection and can move the genetics of your cow herd forward into the next century without the cost of purchasing and maintaining a variety of bulls.

Rob and Lori Thomas of Thomas Angus Ranch, located near Baker City, Ore., rely strictly on AI to breed their 600 head of Angus females. They believe that no matter what size your herd, AI affords you flexibity in your genetic selection and can be used effectively.

"Whether you are a small or large producer, AI allows you to use any sire that is available," says Rob Thomas. "The options of bulls available through artificial insemination give you the opportunity to improve your herd and, in return, increase profits and make your cattle worth more."

Before the advantage of AI can be realized as increased profits in you herd, several things must play out. These include proper sire selection; identifying the opportune time to AI through heat detection; and, finally, maximizing conception rates through proper insemination technique.

When removing semen from a storage tank, remember, the inside temperature of your tank (-320° F) is cold enough to cause frostbite in a matter of seconds.

Don't ever raise the cane above the neck tube of the semen tank or keep the cane in the neck tube for longer than 10 seconds.

The tank should be stored and handled in a well-ventilated area. Although nitrogen is ordinarily a harmless gas, it can cause suffocation in a closed area.

Sire selection

The selection of AI sires depends on the goals you have for your herd and the weaknesses you have identified.

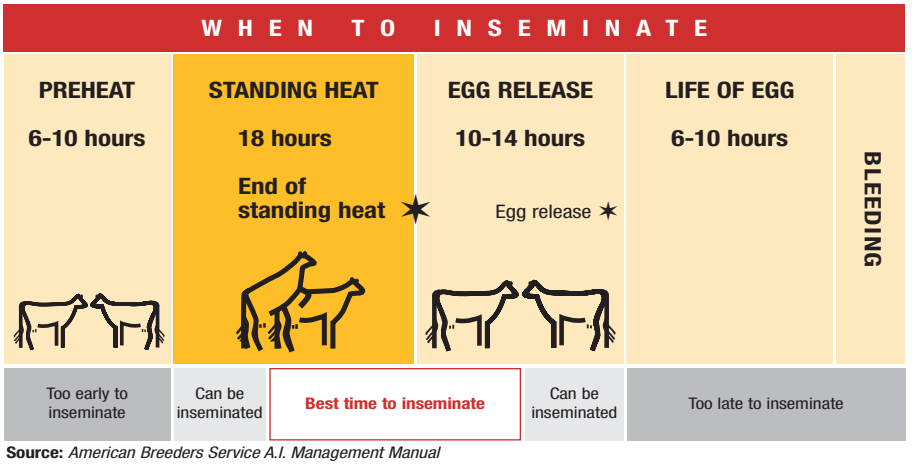
"You might as well get out of it what you want," stresses Clarence Van Dyke, Van Dyke Angus, Manhattan, Mont. In addition to owning registered Angus cattle, Van Dyke was an ABS district representative for several years. During his time with ABS, he helped teach an annual AI class where he emphasized the importance of genetic information in sire selection.

"The information is available to make decisions that will be beneficial to your herd," says Van Dyke. "I always stressed the importance of the accuracy value given to a bull."

Rob and Lori Thomas don't hesitate in saying that their philosophy in selecting sires revolves around picking high-accuracy bulls. They have found that when they are looking for a lower-birth-weight bull to breed to first-calf heifers or for a high-growth bull, those expected progeny differences (EPDs) mean much more when there is accuracy behind them.

"We want to improve on strengths as well as correct weaknesses, and accuracy values make us more confident in our selections of the bulls we use," says Lori.

When looking at EPDs and hand-mating your females, look at the accuracy number located beside the EPD. Accuracy values range from 0.0 (the lowest) to 0.99 (the highest).



Source: *American Breeders Service A.I. Management Manual*

Your EPD targets won't necessarily be the same as your neighbor's, let alone a producer three states away. Your targets will hinge on the needs of your customer base, as well as your land, feed and labor resources and your personal preferences. If you have questions, contact the American Angus Association regional manager in your area (see page 256).

Heat detection

Now that you have hand-matched each of your selected sires with your females, you are ready to begin the process of watching your females for signs of estrus (heat).

Bill Jackson, Kansas State University (K-State) instructor of animal sciences and industry, has taught an AI class through K-State for the past three years and, before that, a class through the Kansas Artificial Breeding Service Unit (KABSU). Jackson says AI technicians must recognize the signs of heat because they can't rely on the bull to do it for them.

"There are numerous signs of heat that can easily be seen, but others are not so obvious," says Jackson. "The one sign that ensures that the cow is in heat is if she stands to be ridden."

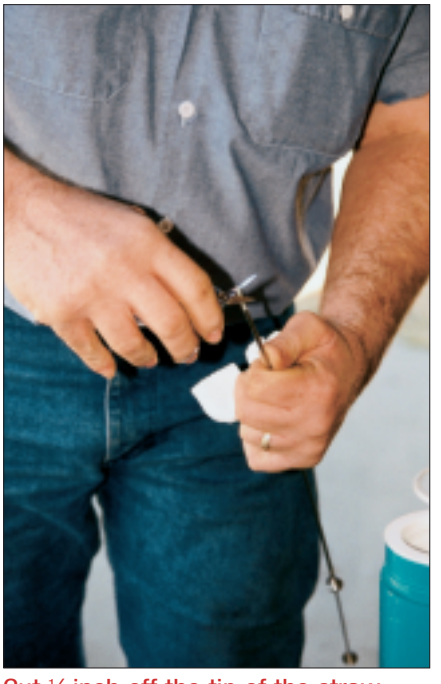
Other signs include straying from the herd, excitement or nervousness, mud or matted hair on the tail head, mucus flow, and red or swollen vulva.

Once you see a cow stand to be ridden, she should be bred within a 12-hour period, says Jackson, adding that the time should be at the convenience of the inseminator.

"Some people follow the method of

To thaw, place the semen straw in a thermos filled with water between 92° and 98° F. The straw should stay in the water for a minimum of 30 seconds.

Before inseminating the cow, it's a good idea to double-check the bull identification number on the straw to make sure you have thawed the right semen.



Cut ¼ inch off the tip of the straw once it's loaded in the syringe.

before 10 a.m., breed that night; after 10 a.m., breed the next day. In my mind it doesn't matter, because with natural service a bull will inseminate a cow right when he finds her in heat."

In the *American Breeders Service A.I. Management Manual,* which is distributed as a supplement to classroom training, insemination time is broken into four time periods (see page 73). Breeders need to pay attention to activity and breed accordingly.

Preheat, which ranges between 6-10 hours, is the period right before the cow comes into standing heat. You should not breed a cow until you see her standing. The period of standing heat lasts 12-18 hours. The egg is usually released 10-14 hours after the cow goes out of heat. Because the life of an unfertilized egg is short and because it takes sperm five to six hours to swim to the oviduct and prepare themselves for fertilization, inseminations at or after ovulation are usually low in fertility. Ideally animals should be in the middle to the end of standing heat when inseminated.

Since there is a short window of opportunity to breed a cow after she has stood to be ridden, it is suggested that you watch for 30-minute intervals both as early in the morning and as late at night as possible. Research done by Cornell University has shown that 68% of estrous activity is expressed during the evening and early morning hours, specifically between 6 p.m. and 6 a.m.

Twice-a-day checks are a minimum, and in larger herds it may be necessary to check more frequently.

Basic AI technique

What is a fairly simple process can be mammoth for someone starting out, says Van Dyke. The reproductive efficiency of your cow herd will depend on the skill of the inseminator.

Some of the major sire studs offer courses that normally last three to four days and cost $200-$400. Along with the basic steps of AI, how to handle semen and how to breed a cow, several other topics are covered, including nutrition, synchronization, sire selection and an explanation of the estrous cycle.

If you are interested in learning how to AI, check with these organizations that schedule classes and/or conduct on-farm training: ABS Global, Alta Genetics, Select Sires, 21st Century Genetics and Accelerated Genetics.

Check with the animal science departments of area colleges. Many offer AI classes that can be taken for college credit.

Here's a quick glimpse of the technique.

You have a cow that has been in heat. You've coaxed her into a chute and are ready to try your hand at AI. To begin the process, remove a straw of semen from your nitrogen-filled tank.

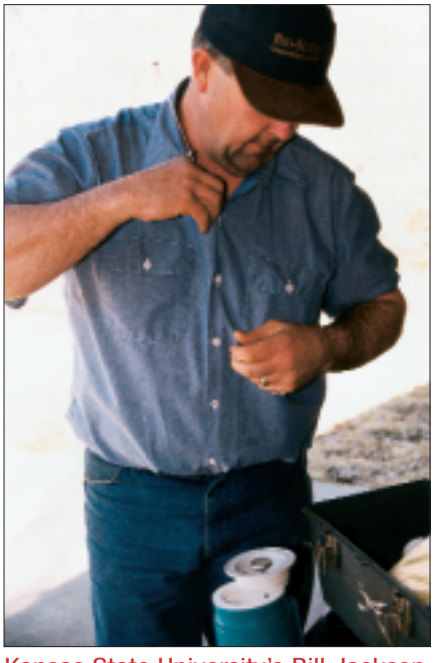
Liquid nitrogen is comparable to boiling water. The inside temperature of your tank (-320° F) is cold enough that it can cause frostbite in a matter of seconds. For that reason you need to be careful when handling the tank and removing straws of semen.

It is suggested that you wear gloves and safety glasses when working with liquid nitrogen. The tank should be stored in a well-ventilated area. Although nitrogen is ordinarily a harmless gas, it can displace oxygen in a closed environment and cause suffocation.

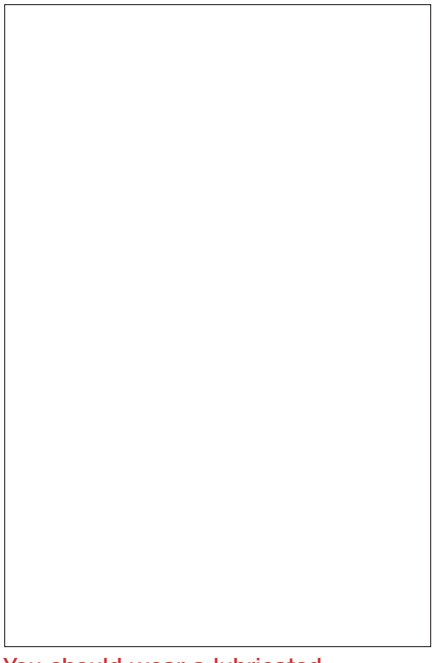
When removing straws from a tank, never raise the cane above the neck tube. Don't keep the cane raised in the neck tube for more than 10 seconds. Longer periods of contact with outside air temperature can result in sperm damage.

"Everyone worries about the sunlight hurting semen; but, if you are careful, it is not a problem," says Jackson. "The main thing that sunlight will do is dry out the semen if you leave it out too long. Make the

There are several types of syringes (or guns) on the market, including the spiral syringe and the "O-ring" syringe. Each has a uniquely suited disposable sheath style.



Kansas State University's Bill Jackson suggests putting the loaded syringe in your shirt — not your mouth — to protect it from air and contamination while you make final preparations.



You should wear a lubricated, shoulder-length plastic glove on the arm that will go into the rectum of the cow. To avoid transmitting disease, use a clean glove with every cow.

process quick, from the tank to the water bath to the syringe."

To thaw, place the semen straw in a thermos filled with water at 92° to 98° F. "The ideal temperature is right at 98 degrees," says Van Dyke. "Anything above that will kill the semen." The straw should stay in the water for a minimum of 30 seconds. When you remove the straw from the thaw water, you should completely dry off the straw. Jackson warns that water will kill sperm.

"I tell my students that are learning how to AI in my classes that semen should not be mixed with water, urine or Copenhagen, because they kill the semen," he says.

At this time you should double-check the bull identification number to make sure you have thawed the right semen.

Load the semen in the syringe. There are several types of syringes (or guns) on the market, including the spiral syringe and the "O-ring" syringe. Each syringe has uniquely suited disposable sheaths to be used with them.

Once you have the semen loaded, Jackson suggests putting the syringe in your shirt. "Don't stick the syringe in your mouth. Put it down your shirt to protect it from air and contamination," he says.

Last of all, you will need to put a

Move the cow's tail to the outside of the arm that will go into the rectum. With your gloved arm, enter the rectum of the cow up to wrist depth. Using the hand outside the cow, wipe away any genital discharge around the vulva before inserting the syringe.

Training schools sometimes use the reproductive tracts from harvested cows and heifers to allow students to see what they'd feel in the live animal.

Insert the syringe through the vulva into the vagina, trying to keep it free from external contaminants. Once inside, the tube of the syringe will be in the vagina of the cow.

"The vagina is the major distance you will have to travel with the tube, and it is not a straight shot," says Jackson. "Move the cervix forward to straighten out the vagina."

The cervix, a series of three or four folds or rings, is positioned right after the vagina. Mel DeJarnette, Select Sires reproduction specialist, says to master the AI technique you need to think in terms of placing the cervix over the gun, not the gun through the cervix.

Break the chain

History has shown that transmission of several common diseases can be eliminated through the use of artificial insemination (AI). Certified Semen Services (CSS), a subsidiary of the National Association of Animal Breeders, requires all participants to follow a set of minimum regulations that include: health testing of the donor bulls and mount animals, proper identification and sanitation during semen collection and processing and the addition of specific antibiotics to semen and extender.

Jere Mitchell, CSS Service Director says that testing of bulls before entry, during an isolation period and through residency at an AI center while semen is being collected, help ensure that the bull will not spread tuberculosis (TB), brucellosis (Bang's disease), leptospirosis, bovine viral diarrhea (BVD) virus, campylobacteriosis or trichomoniasis through his semen.

Artificial insemination with "CSS Health-Certified Semen" breaks the chain for all of these diseases, which carry a threat to be seminally transmitted.

"The CSS has a set protocol for health testing of animals," explains Mel DeJarnette, Select Sires reproduction specialist. "This helps identify diseases and significantly reduces transmission. With the CSS logo on semen straws, you can put faith into the fact that this semen will not make your cow sick."

Mitchell points out that testing of bulls for other diseases like Johne's, infectious bovine rhinotracheitus (IBR), bluetongue and leukosis are not required by CSS for domestic use because there is very little evidence of these being transmitted in semen. However several foreign countries include them in their semen import requirements. Most commercial AI centers will include many of these other disease tests as a part of their extensive preventive medicine programs and also to accommodate the various international requirements.

Mitchell says that CSS has set these minimum requirements to prevent the spread of venereal diseases, thereby protecting the health of the herd in which the semen is used.

shoulder-length plastic glove on the arm that will be going into the rectum of the cow. Now you are ready to inseminate.

"Approach the cow slowly," says Jackson. "The key is safety. Say something and let her know that you are back there."

Next, move the cow's tail to the outside of the arm that will be going into the rectum. With your gloved arm, enter the rectum of the cow up to wrist depth. Using the hand outside the cow, wipe away any genital discharge around the vulva before inserting the syringe.

"Cleanliness is important because you don't want to drag in any foreign materials," says Van Dyke.

Insert the syringe through the vulva into the vagina, trying to keep it free from external contaminants.

"The vagina is the major distance you will have to travel with the tube, and it is not a straight shot," says Jackson. Feeling the reproductive tract through the rectum wall, "move the cervix forward to straighten out the vagina."

The cervix, which is about 3 inches long and ¾ to 1 inch wide, is positioned right after the vagina. Jackson explains the cervix as a series of three or four folds or rings, which are compressed tightly and protrude toward the vagina.

"You can't just blindly poke and prod and expect to breed many cows," says Mel DeJarnette, Select Sires reproduction specialist. "You must learn how to guide the gun to and through the cervical opening. With your thumb above and forefingers below the cervical opening, grasp and manipulate the cervix over the insemination gun."

DeJarnette warns that you should not think in terms of placing the syringe through the cervix but rather placing the cervix over the syringe.

"You have to relax and be patient," says DeJarnette. "To become proficient you must see with the tube is your fingertips."

Once the tube is through the cervix, semen should be deposited in the small (¾ inch) uterine body. "In general, I don't recommend horn-breeding," says DeJarnette. "The risk of uterine damage for the beginner inseminator far outweighs potential benefits. Results of research related to horn-breeding have been inconsistent; however, the data does suggest horn-breeding is superior to semen deposition in the cervix or vagina.

"Thus my recommendation is to target the uterine body, but lean to the horn rather than the cervix when exact gun-tip placement is in doubt."

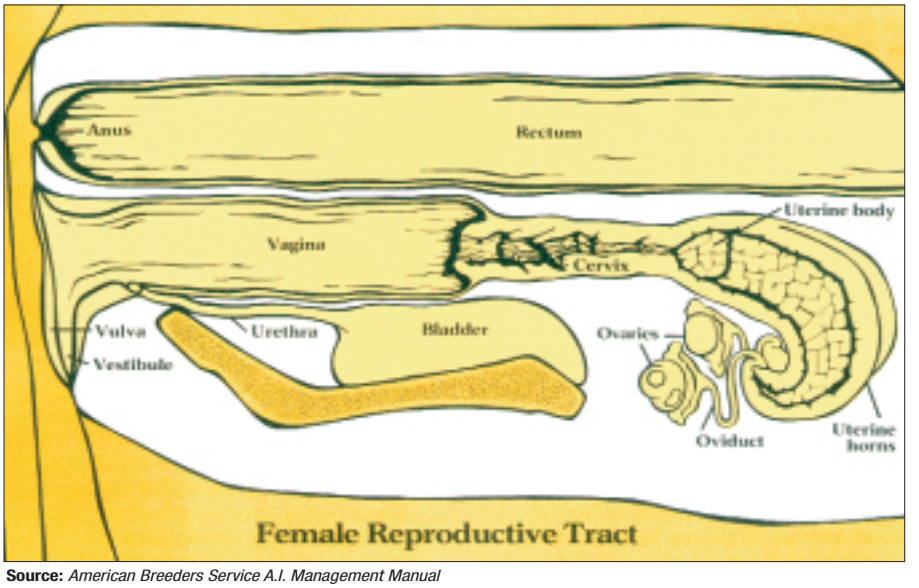
Once the semen is deposited, the contractions of the uterus will help pull the semen forward. Slowly remove the syringe, then take your arm from the rectum.

Jackson does not suggest massaging the uterus. If the cow is in heat, the best thing you can do is get away.

"There has been some research done on massaging the clitoris. In my opinion, I think that you need to leave her alone," says Jackson. "Keep everything comfortable. You are doing the best that you can if you keep the semen, cow and the inseminator comfortable."

Results

With AI to a detected heat, an average conception rate would be 70%; higher than 80% would be considered outstanding,



Source: *American Breeders Service A.I. Management Manual*

while less than 50% would be considered poor, says Twig Marston, K-State Extension beef specialist. With synchronization, breeding to a detected heat will typically result in conception rates near 50%. Conception rates of 40% are expected with synchronization and timed insemination.

DeJarnette adds that with good heat detection, quality semen and proper insemination techniques conception rates with AI will be equal to or greater than those obtained with natural mating.

"The major limitation to a successful breeding program — AI or natural service — is management," DeJarnette says. "Proper nutrition, herd health and maintenance of short breeding and calving seasons will ensure animals resume normal cycling activity within a reasonable time for calving.

"The day you decide to breed your cows by AI you automatically become a better manager," he adds. "You begin watching your cows and noticing problems you would have never picked up on with the bull doing all the breeding. These problems were probably always there; you just never noticed them or realized how much of a problem they really were."

Bill Jackson has taught AI classes at Kansas State University and the Kansas Artificial Breeding Service Unit (KABSU). Training is available at several universities and through sire studs.

AI is a tool. As such, it should be used to genetically improve your herd. It has the potential to take breeders another step closer to their goal of correcting weaknesses and building strengths that lead to profitability.

Currently the sale of semen in the Angus breed is strong. The National Association of Animal Breeders (NAAB) reports domestic Angus semen sales for 1998 were 598,260 units. Angus export sales of semen more than doubled from 103,886 in 1996 to 210,527 units in 1997. In 1998 export sales of Angus semen included 161,398 units.

The strength in sales can be linked to the confidence breeders have in semen and in AI. No longer does the breeder have to wonder if the bull is getting the job done.

"You can count on the semen that is collected from CSS-approved centers to be of high quality and of disease-free health status," says DeJarnette. "You can't always depend on a natural bull to be healthy and able to get the job done. It puts the breeding practice into your hands."