

AI Advances in the Beef Industry



by Heather Smith Thomas

The earliest documented use of artificial insemination (AI) was in 1780 when an Italian physiologist produced puppies using this method. A few other reports of successful AI breedings appeared in the 19th Century, but it wasn't until about 1900 that extensive studies with farm animals began in Russia.

By 1938, AI was being done in U.S. dairy herds. At first, people were using extended and cooled liquid semen, packaged in glass ampoules (vials). Allen Bush, communications coordinator, All West, Burlington, Wash., says early

AI was all done with fresh semen, cooled and stored in an ice bath. "Eventually it was put into ampoules and then they started freezing it," Bush says.

Carl Rugg, owner/president, Bovine Elite LLC, College Station, Texas, says that when he first became involved in AI, the process was done by veterinarians and later by specialized AI technicians who were employees of AI cooperatives.

"The distributor would bring the veterinarian three or four bulls. The semen would be collected, extended with a media, placed in glass ampoules and kept in an ice bath. That semen would be viable for two to five days, depending on fertility of the bull," he says.



Carl Rugg says a lot of progress has been made since the early days of artificial insemination (AI).

Newer technology

A lot of progress has been made in reproductive and semen technology since those early days. Rugg earned his master's degree in reproductive physiology at Colorado State University about the time AI moved to the next phase, packaging and freezing the semen in French straws.

"We continue to use this technique and packaging method, which allows

semen to freeze and thaw with higher recovery and ultimately better conception rate. This is an improvement over trying to handle those old glass vials," Rugg adds.

Another advancement in the past 20 years was being able to get genetic proof on bulls. "This is very important when breeding heifers," says Darrel Wilkes, US beef supply systems manager, ABS Global, Loveland, Colo. "You know that if you pick a high accuracy sire with calving ease, today you don't have to give up all the other good traits. We've definitely bent the genetic curve between birth weight and growth. In the old days, a calving ease bull would give you a live calf but his calves were smaller at weaning."

Wilkes says now many of their customers breed their heifers AI for calving ease and to front-load their calving season with heifers so they have more time to rebreed.

"Also they keep replacement heifers from those first-calf heifers. Those calves will have the most modern genetics," he explains. Also, if you keep heifers that were born easy, they tend to be easy calvers themselves.

During the past 10 years, the biggest breakthrough has been the development of more effective synchronization protocols, making AI much easier. All the cows can be bred on the same day instead of having to watch for heat. Conception rates have also improved. Being able to ultrasound the ovaries and determine the time of ovulation helped researchers figure out the best time to inseminate cattle. This information enabled the AI industry to obtain better conception rates.

"We're now using timed AI, where you synchronize everything, and then on appointment you breed them all — without having to look for those that come into heat," Wilkes says.

Willie Altenburg, associate vice president of beef marketing, Genex, Ft. Collins, Colo., says AI has worked well for heifers for many years. "We've been struggling

with cow AI, however. The advent of the CIDR has really helped, so we've been doing more cow AI. Synchronization and fixed time insemination has made it to where we need an army of arms to get this accomplished. Most producers can't breed 100 cows in one morning."

The AI organizations now have portable breeding barns and technicians who can come do this chute-side service for the whole operation — and get those cows all bred in a few hours.

Jack Ganje, owner of Universal Semen Sales, Great Falls, Mont., says the biggest advantage for the AI business has been the heat synchronization and timed AI. "It's more economically feasible for many cattlemen to use AI now. In our part of the country there are a lot of grain farmers and the time of year for AI is the same time they need to be in the fields. Conception/pregnancy rates are as good now with timed AI as they are with heat checking and breeding. So you are not giving up anything by doing it with timed AI."

Genex Area Sales Manager Morgan Johnsrud, Jordan Valley, Ore., says one of the most successful protocols uses the 14-day CIDR with prostaglandin in a timed AI scenario. "Results gathered by the reproductive task force, while working with various reproductive protocols and tweaking them, have shown consistent average of about 65% conception with timed AI. It's great when you can get 65% of your heifers pregnant on day one of the breeding season," Johnsrud explains.

This increased success has made AI more appealing to producers who are concerned about labor. "We've come a long ways since the single or two-shot protocol and riding through the herd for a couple of weeks to detect heats," he says.

Benefits of using AI

Having a high percent of females pregnant early always makes the producer money. With AI you can select the genetics you want for

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Portable breeding barns

A helpful tool for producers implementing an artificial insemination (AI) program is a specialized portable breeding barn.

Darrel Wilkes, US beef supply systems manager, ABS Global, Loveland, Colo., explains, "These look like a horse trailer. Most of the ones we use will accommodate two cows at a time."

It's dark and quiet in the little barn, conditions that reduce stress. "They are not restrained in any way; their head isn't caught, so they aren't fighting the confinement. They are standing on the ground rather than a floor, which also helps keep them calm and comfortable," explains Wilkes.

The most popular model is the Large's breeding barn, invented by Marvin Large, a longtime ABS rep from western Nebraska. "After breeding tens of thousands of cattle in an old chute or some other inadequate facility, Marvin started figuring out a better system. When we breed heifers at Simplot's facility at Grandview, Idaho, we usually have two of those set up, with a three man crew in each barn. Two people are breeding and the other person thaws semen. With this system we can breed 200 heifers per hour," Wilkes says.

According to Wilkes, Colorado State University did a survey a few years ago, and the reason cited most often by producers as to why they don't AI was not the cost; it was the hassle factor and facilities.

"When you can do total synchronization and timed AI, and bring in a breeding barn, you cut the hassle factor by 80% and solve the facility problem. All you need is an alley or running chute to bring cattle to the breeding barn," Wilkes says. **HW**



Marvin Large served as an ABS beef representative for decades. He invented the breeding barn and works with a company to manufacture and sell the trailers today.

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— Allen Bush



certain traits. You can breed heifers to calving ease bulls with high growth and good maternal traits (and keep replacement heifers from that group) and the cows to a high performance bull or terminal sire for bigger calves to sell or to make money on retained ownership through the feeding phase.

“I make more money with an \$18 straw of semen than I do with anything else I do with my cows,” Altenburg says.

“Just getting heifers to calve early in the season not only gives them a higher probability of remaining early-calvers for the rest of their lives but you more than pay for the AI with the added weaning weights of their calves,” says Wilkes. Improved genetics is a plus, calving ease is a plus, but if those calves are 10 days older they are 20 lb. heavier, which more than covers the cost of the AI program. This gives heifers’ calves a chance to fit more uniformly with the mature cows’ calves.

“Heifers are very easy to AI because you don’t have to sort calves off them,” Wilkes says. “Most of our reps can go onto a ranch, and with just a cowboy or two to push cattle through the chute, they do 200-300 heifers before lunch. The reps manage the synchronization program and bring in a breeding barn, and it’s easily accomplished.”

Bush adds that with today’s market prices and the value of cattle, more people are considering use of AI. “They are not just breeding heifers AI for calving ease (which has been the entry level for most producers). They are now looking at carcass traits they can get if they breed the cows to certain AI bulls,” he says.

More advances in reproductive technology

Rugg says one of the biggest advances has been in-vitro fertilization of embryos. “The producer may have a

great cow that’s getting old and she’s not producing as many embryos as desired. So we can aspirate ova from her ovaries and fertilize them in-vitro,” he says.

Some of the other new technologies include cloning and improved flushing techniques. Flushing donor cows in conjunction with use of sexed semen adds value to maternal lines and cow families.

“We are also seeing more exported semen,” says Rugg. His company exports a lot of frozen semen and

embryos to Central and South America. “We continue to see use of high-end bulls in Central and South America, South Africa, Australia and other areas of the world. The embryos are contracted as needed. We don’t have an inventory of embryos; these are custom produced for the client,” he explains.

Another new development has been the change from half cubic centimeters (cc) to quarter cc straws. “Supposedly you get a more uniform thaw than with the earlier methods, because it has a smaller diameter and there is more consistency in the temperature,” says Ganje. “Thus you get a better thaw and better recovery of the sperm cells. On down the road we may end up with an even better method — maybe something like freeze-dried semen.” **HW**

Beef Reproductive Task Force and its role

John Hall, University of Idaho Extension beef specialist, says his ranch crew works with the Beef Reproductive Task Force and Reproductive Leadership Team in doing their artificial insemination (AI) protocols.

“The task force is a group of those of us who do beef reproduction at various universities, doing research on estrous synchronization and AI,” Hall explains. “The leadership team includes representatives from the task force, AI studs, the pharmaceutical industry and veterinarians. That’s the group that came up with recommended estrous synchronization protocols for AI — recommendations in the back of the AI catalogs.”

The group looks at research from all the universities on different AI systems. “When one of them looks promising, we analyze the data to see if we have enough animals/numbers for valid conclusions, and whether it is consistent enough to say it’s better than what we were doing before,” he says. “We decide whether this is something we want to put on the list of recommended protocols, and determine which ones to take off the list.”

The group tries to select only protocols that are best for the cattle and for the people doing the work and also looks at cost.

“AI studs continue to work on different extenders for semen. If they feel a different extender is working better, they’ll change. At the universities we may be involved in helping with blind studies on things like that,” Hall explains.

The group had looked at fixed-time AI systems — synchronizing and breeding the entire group at one time. “We’ve noticed a lot of progress on the ability to successfully AI post-partum beef cows,” Hall says. In the past, heat-synch protocols were mainly used on heifers.

He says the big keys for AI now are management issues. “The cows need to be in good body condition score and at least 30 to 40 days post-partum, before you start a synchronization program,” he says. If a cow is too thin or has not recovered enough from calving, she won’t conceive. **HW**