

Use Technologies Wisely

Maximizing the potential of reproductive technologies means understanding what factors can impede success.

by *Kasey Brown*, associate editor; & *Katy Kemp*, freelancer



Reproductive efficiency often depends on strategic use of new technologies; however, experimenting with unproven technologies that don't pan out can also be expensive. Speakers at the Applied Reproductive Strategies in Beef Cattle (ARSBC) symposium hosted in Stillwater, Okla., provided insights last fall into a few options available to cattlemen.

Sexed semen

"Sexed semen is a technology whose time has come in the beef industry; however, producers need to understand the risks and limitations," said John Hall, superintendent of the Nancy M. Cummings Center at the University of Idaho.

Gender-selected semen is gaining popularity and use in the beef industry, with more bulls with gender-selected semen becoming available through bull studs. Pregnancy rates with gender-selected semen, on average, are about 15%-20% lower than those bred by conventional semen. However, there are some factors affecting pregnancy rates, including the timing of insemination and the bull's effect on sorting semen, that producers need to understand to make the most of the technology.

Breeding with gender-selected semen after detected estrus has provided the best results in several studies, he shared, though fixed-time artificial insemination (FTAI) is feasible.

Hall reported that there is a 20%-35% reduction in transferable embryos when using gender-selected semen. However, even though fewer embryos are obtained with gender-sorted semen compared to conventional semen, the embryos are 90% of the desired gender. Therefore, fewer recipients are needed and fewer animals of the undesired gender are produced.

Another option is called reverse sorting. This sorts previously frozen semen by gender, which can allow production of gender-selected semen from bulls no longer producing semen. Hall said it is generally used for *in vitro* fertilization (IVF).



PHOTOS BY TROY SMITH

► **Gender-sorted semen is here to stay, said John Hall, adding that fertility will improve as sorting damage decreases, synchronization protocols are more adapted and bull selection for gender-selected semen is more established.**

The most exciting use for gender-selected semen, Hall said, is to produce maternal lines to be mated to terminal lines, a practice which is limited in beef cattle compared to other meat animals. Producing maternal lines

by means of replacement heifers would be quicker and use fewer resources with use of gender-selected semen. This could also produce higher-quality females without producing subpar steers in the process.

Gender ratios could also shift with use of gender-selected semen given the desires of the operation. Seedstock applications include using Y-sorted

semen for bull production, and X-sorted semen for replacement-heifer production or enhancing female lines.

Commercial operations can use it to create a marketing advantage by producing more steers for a uniform trailer load and to meet

specific customer needs. He shared data that showed three loads of

similar-quality cattle, two all-steer loads and a mixed load. The heifers were discounted in the mixed load, and the steers were also discounted for being in a mixed load. The all-steer loads earned \$5,180 and \$6,746 more than the mixed load.

In this case study, Hall noted, the mixed-load cattleman already used AI, and the additional cost of using gender-selected semen would add \$2,000-\$3,000, which would still be accounted for in additional profits.

He concluded that sexed semen is here to stay, and fertility will improve as sorting damage decreases, synchronization protocols are more adopted and bull selection for gender-selected semen is more established. Applications continue to improve.

— by *Kasey Brown*

Embryo transfer

To have a successful embryo transfer (ET) program, donor/recipient selection and management are key. Knowledge, skills and expertise make a difference; you can never be too understaffed or underequipped, said Brad Stroud.

When evaluating an ET program's influence, Stroud analyzes three areas:

1. Embryo production: management of the donor.
2. ET conception rates: management of the recipient and heat detection.
3. Consistency: reliability of practitioner and resources.

According to the American Embryo Transfer Association (AETA), the national average of viable embryos per flush is 6.9, and only 54.6% of total ova recovered are viable. Proper donor management can influence the number of viable embryos. Stroud's data suggested donors are in the best reproductive status when lactating and between the ages of 2 and 10 years. Donors should also be fleshy, but not fat or thin for best results.

"Young to middle-age cows produce the best results when wet (nursing)," Stroud said.

Once embryos are collected, recipient management is the second factor to influence conception rates of an ET program. Recipient's forage intake should be monitored. Additionally, use of accurate heat detection and ultrasound technology

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can indicate the presence of a corpus luteum (CL). He warned against selecting open cows within the herd for recipients.

“The most common mistake of recipient management is the selection of old, dry, fat cows within the herd,” Stroud said.

Lastly, Stroud emphasized the importance proper facilities and the practitioner have on consistency of success. Effective ET managers and practitioners minimize negative flushes, are reliable and accurate with heat detection, know the cows and forage, and are skilled with artificial insemination (AI), he said.

— by Katy Kemp

Frozen semen

While not a new technology, there are still plenty of tips to help cattlemen get more efficient use of frozen semen in an AI program. From collection to insemination, Stroud said, there are many opportunities for accidental thermal exposure to decrease fertility of a straw of semen. Stroud explained proper semen-handling techniques.

Once semen leaves the quality control of a bull stud, too many chances for mishandling occur, he said. Stroud emphasized that there is no organized curriculum for managing and handling cells and tissues in liquid nitrogen. As a result, numerous handlers have



► Proper management practices influence the viability of an ET program, said Brad Stroud, Stroud Veterinary Embryo Service.

no formal training or education on proper handling, and instead rely too much on “cowboy logic.”

It’s important to refrain from “cowboy logic” about semen handling, he warned. Believing a straw is still frozen and therefore viable is false reliability. His data suggested any time the internal temperature of a straw went above -130°C , recrystallization occurs. The temperature of liquid nitrogen is -196°C .

Recrystallization multiplies for each accidental thermal exposure to a straw of semen, increasing the size of crystals within the straw and destroying the fertility of sperm cells. Stroud’s research also determined

fertilization is likely depressed after more than 8 seconds of exposure.

Stroud demonstrated that even handling semen within the neck of a Dewar semen jug exposes straws to temperatures well above -130° . To avoid risk of decreased fertility, handlers should use a liquid nitrogen bath at all times, including when “breaking canes” and checking inventory.

“It only takes 10 seconds in the neck of a one-half-full Dewar to reach -100° Celsius internally, and -130° Celsius is the critical temperature,” said Stroud.

Education is the key to avoid mishandling frozen semen. To limit loss of fertility from improper handling, Stroud recommended *The Guide to Handling Frozen Semen & Embryos*, which can be found by visiting <http://biotechproductions.com>.

— by Katy Kemp



Editor’s Note: Hall and Stroud spoke during Thursday’s session focused on advanced reproductive technologies. Visit the Newsroom at www.appliedreprostrategies.com to view their PowerPoints, read their proceedings or listen to their presentations. Compiled by the Angus Journal editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force and provides comprehensive coverage of the symposium.