

Sexed semen

I frequently receive questions about the use of sexed semen (gender-selected semen) for beef cattle systems. Because one of the Angus Journal's keys to success is technology, I thought I would answer some of those questions associated with the opportunities for use of sexed semen and potential areas where it could be used in a beef operation.

Ins and outs of sexed semen use

What is the availability of sexed semen?

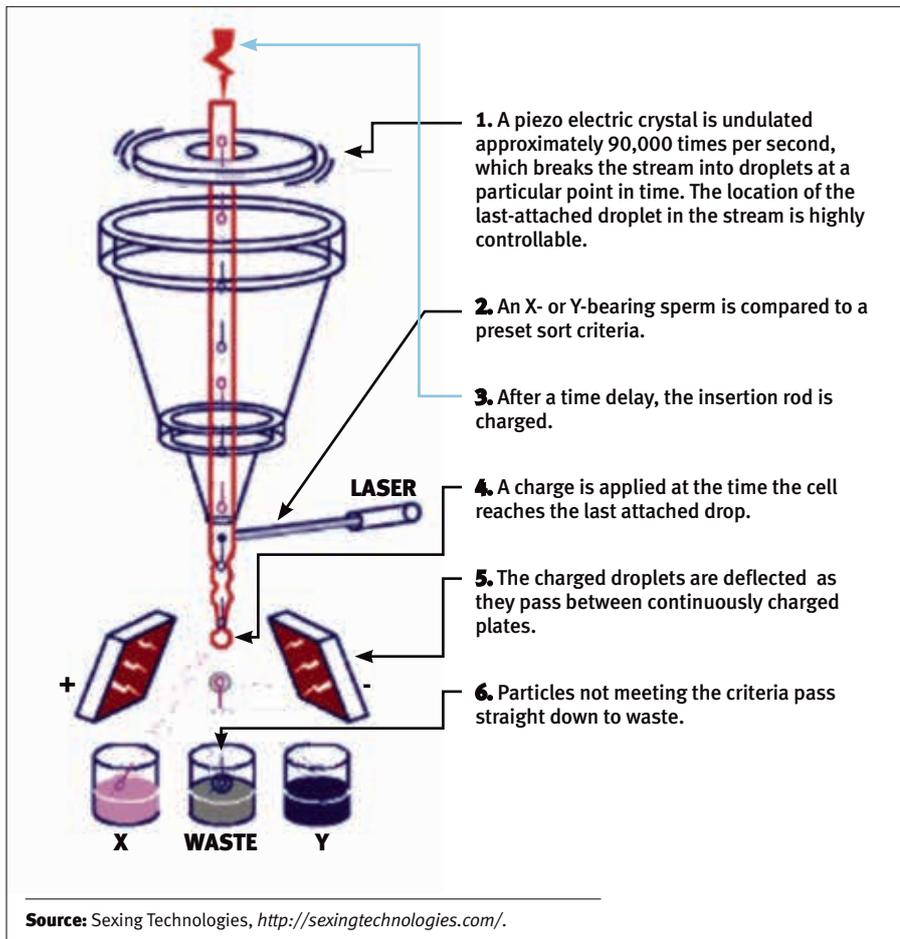
The use, limitations and opportunities of sexed semen in beef operations is becoming clearer as research in this area continues to advance and sexed semen becomes more available. During the past six years, the number of beef bulls with sexed semen available through the major genetic companies has increased from 0 to as many as 80 bulls in the United States. Therefore, opportunities

exist for producers to utilize the technology in their operations to enhance productivity.

How is sexed semen produced?

There is only one reliable way to sort semen by sex (see Fig. 1). This method is called flow cytometry or cell sorting. It involves sorting each sperm cell individually. Essentially, X-bearing sperm contain slightly more DNA than Y-bearing sperm and, therefore, weigh approximately 3% more.

Fig 1: Diagram depicting the sexing semen procedure



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After collection, the semen is extended and treated with a dye. Then each sperm cell is placed in individual droplets. The dye will fluoresce when exposed to a laser differentiating X- from Y-bearing sperm.

Based on the sex determined, a charge is placed on the droplet and the charged deflector sorts the sperm into one of three collection vessels — X, Y and waste. Sperm that are damaged, oriented incorrectly, or cannot be “read” are discarded. Sorting accuracy can be adjusted, but most companies sort for 90% accuracy.

When using sexed semen, what should I expect to be different from conventional semen?

In general, fertility with sexed sperm is lower than with unsexed semen, especially if producers inseminate on appointment with fixed-time artificial insemination (FTAI). Therefore, profitable use requires careful consideration since the increased cost of sexed semen is approximately \$15-\$25 per dose compared to conventional semen.

In addition, sexed semen is packaged in 0.25-mL straws, which requires a different insemination gun than the standard 0.5-mL straws (unless you have a universal gun that uses both 0.25- and 0.5-mL straws). There is a slight theoretical advantage in semen quality with use of the smaller straws, but they require more careful handling due to the larger surface-to-volume ratio compared to the larger straws.

Can I use sexed semen in heifers and cows?

Initial recommendations were that sexed semen should be used in replacement heifers

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that had been observed in heat. However, with the advancement of research and increased understanding of the use of sexed semen, there may be opportunities in cows where sexed semen has applications. Early research work summarized by George Seidel from Colorado State University, which combined results from dairy and beef heifers, indicated that conception rates to sexed semen were 70%-90% of conception rates to conventional semen.

Subsequent research by numerous other scientists indicates similar results in heifers that were detected in estrus, whereas heifers inseminated after FTAI had more variable results and pregnancy rates that ranged from a 10% to an 80% reduction in pregnancy rates. Results in beef cows appear to be similar to those in beef heifers. Cows inseminated with sexed semen that had been observed in heat tend to have a similar reduction in pregnancy rates to heifers inseminated with sexed semen.

Are there differences in fertility of sexed semen among bulls?

It appears that differences in bull

fertility may be magnified after sorting and increasing the dose of sexed semen from ≈ 2.1 to as much as 10 million sperm did not seem to result in dramatic increases in conception rate. Several researchers have observed considerable variation in pregnancy rates from bull to bull with sexed semen, but in most studies, the number of inseminations per bull limits the power to detect statistically significant differences in sexed semen AI pregnancy rates among bulls.

What are the opportunities for sexed semen in embryo transfer?

Using sexed semen in superovulated cows to produce embryos also results in decreases in reproductive efficiency. Most research tends to indicate a 20% to 35% reduction in the number of transferable embryos when using sexed semen. Most of this reduction is due to an increased number of unfertilized ova. This does not mean that using sexed semen is not a viable option for embryo transfer, but more that producers who would like to "flush" cows with sexed semen should select donors

with a known history of successful collections.

Summary

Sexed semen can be a useful part of a breeding program for beef producers. Producers need to remain cognizant of the fact that pregnancy rates to sexed semen are 10% to 20% lower than conventional semen. When using sexed semen in heifers or cows, inseminating only females detected in estrus results in pregnancy rates approaching conventional semen. As the technology advances and more data are collected, more opportunities will exist for incorporating the use of sexed semen into cattle operations.



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