

REPRO TRACKS

by Cliff Lamb, Texas A&M University

Advances in Sexed Semen

For beef cattle production, sex is frequently the most important genetic trait and one is almost always worth more than the other.

There are three points during the production process where sex can be determined before birth: sexing sperm, sexing embryos recovered about a week after insemination and sexing fetuses through an ultrasound of the reproductive system.

Sexing sperm is the only method of these that does not require the discard of embryos or abortion of fetuses of the less desired sex, or using the information for management or marketing purposes. However, sexing semen technology continues to improve and provide opportunities for producers.

First things first

The principle of current methods is to measure DNA content of individual sperm. Bovine X chromosome-bearing sperm have around 3.8% more DNA than Y chromosome-bearing sperm, so accurate measurement enables distinguishing between the X- and Y-bearing sperm.

There are many problems in measuring this small difference accurately, rapidly and with minimal damage to the sperm; but most of these problems have been solved so that sexing sperm is now done

on a large scale. This process is remarkably fast and results in more than 90% accuracy of the desired sex.

As a result of this process, sexed semen typically is priced higher. Nonetheless, to keep costs manageable, fewer sperm are packaged per dose of sexed semen than for unsexed semen, which, together with the stresses of sexing, may result in decreased fertility. In addition, sexed semen is not available for all bulls for a variety of reasons.

Sexed swimmers

Fertility of sexed semen is lower than that of conventional semen, slightly due to fewer sperm per insemination dose and likely because of the stress on sperm from the sexing process. Under ideal circumstances, pregnancy rates are only slightly depressed and within 10% of pregnancy rates using unsexed sperm. However, there is significant variation among bulls on the fertility between sexed and conventional semen.

In some cases, producers may not note any differences and in others differences could be significant. Regardless, when conventional artificial insemination (AI) is used in



poorly managed herds, the resulting pregnancy rates are generally poor; superimposing sexed semen in such situations usually leads to extremely low pregnancy rates.

Currently, sexed semen can be used with great effect in females inseminated after a detected heat; but advances in the technology and current research using sexed semen for fixed-time AI will result in future opportunities for producers.

Superovulated swimmers

A situation in which sexed semen at first seems inappropriate is superovulation. There is huge variation in fertilization rates, although certain bulls work better than others. Numerous studies show

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the number of good-quality embryos recovered when using sexed semen is about 60 to 80% that with unsexed semen (see Table 1).

However, if one sex of embryos does not justify the expenses of embryo transfer (ET), use of sexed semen may be a more appropriate approach than sexing the embryos and discarding those of the undesired

sex. You end up with about the same number of good embryos of the desired sex, even though fewer total embryos are recovered. Also, this is usually considerably less expensive.

Better with time

As with any new technology, costs will continue to decline with time. In addition, success rates will improve,

particularly regarding fertility. Sexed semen will also be available for more bulls, for producing both male and female calves.

In the future, sexed semen could end up being even more fertile than unsexed semen due to the ability to discard the less fertile sperm during the sexing process. Producers should consider how this technology could be utilized in their operations to enhance overall objectives. **AJ**

Editor's note: Cliff Lamb is the animal science department head and a professor at Texas A&M University in College Station, Texas.

Table 1: Summary of experiments demonstrating percentage of transferable embryos recovered from superovulated cows inseminated with either sexed or conventional semen.

Experiment	Transferable embryos, %	
	Sexed	Conventional
Hayakawa et al, 2009	53.4	68.1
Peippo et al, 2009a	70.3	75.0
Larson et al, 2010	39.5	60.5

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