

Sex-sorted vs. Conventional Semen

Scientist explains advances in gender-selected semen resulting in conception rates near that of conventional semen.

by Kasey Brown, associate editor

Sex-sorted semen could help cattlemen advance herd-specific goals like producing high-quality bulls or replacement females. Its biggest downfall has been lower fertility levels compared to conventional semen. Vish Vishwanath, director of research and development for Sexing Technologies Inc., shared new research that has shown sex-sorted semen can achieve fertility rates comparable to that of conventional semen. Vishwanath spoke at the 2015 Applied

Reproductive Strategies in Beef Cattle (ARSBC) symposium in Davis, Calif.

The common theme of early comparisons was that sex-sorted semen's fertility was around 75%-80% that of unsorted semen. He shared data showing that increasing sperm numbers from 2.1 million to 10 million per dose did not significantly improve fertility. That could be due to the necessary amount of handling while sorting, he reasoned.

Since starting in 1989, the process of gender-sorting semen hasn't changed much; however, the method of handling the semen has improved. Traditionally sorted sexed semen, termed XY, was handled in 21 steps (see Fig. 1), which contributed to diminished functional capacity of sex-sorted sperm.

These extra steps also changed the sperm's heterogeneity, which refers to the

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Fig. 1: The cause of diminished functional capacity of sex-sorted sperm is multifactorial

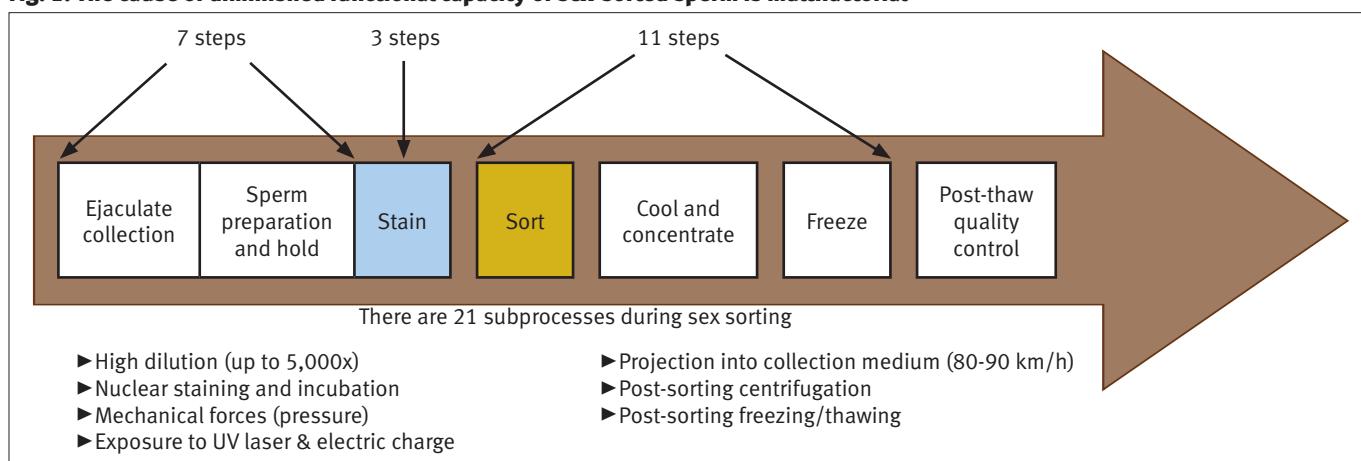
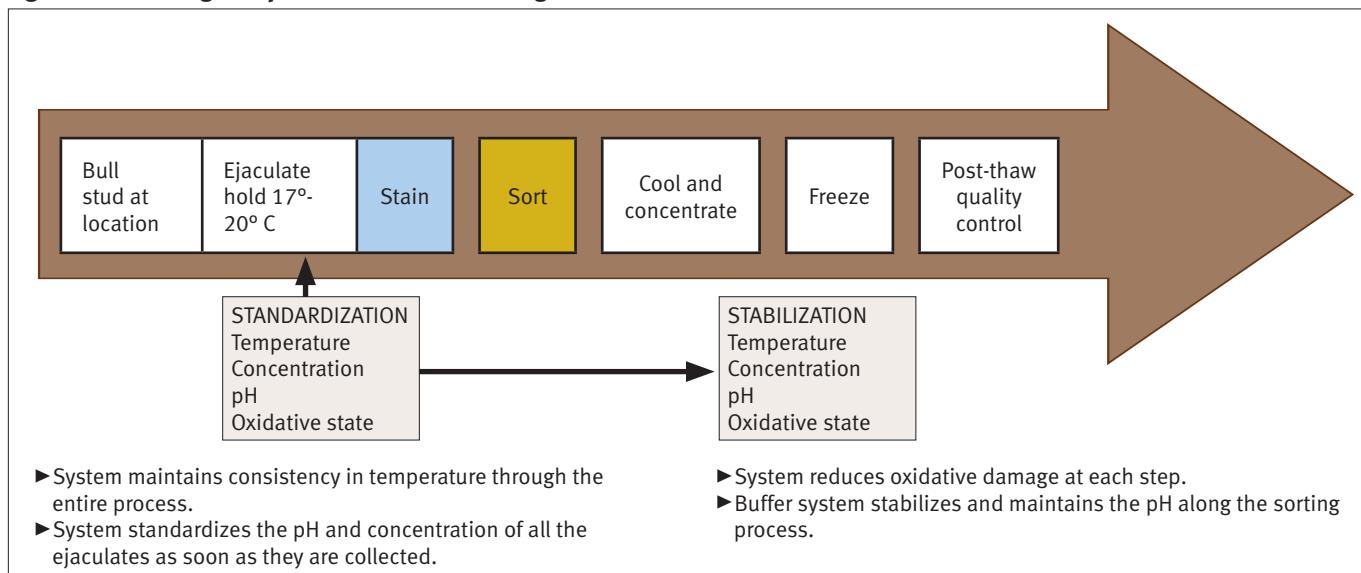


Fig. 2: Recent changes in processes with sex-sorting semen



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sub-populations of sperm that are ready for fertilization at different times once inseminated. Conventional semen contains sperm that can fertilize an egg up to 12 hours after insemination, while sexed semen has been shown to fertilize up to only eight hours after insemination due to changes in physiology, said Vishwanath. This narrower window explains some of the issue with sexed semen's fertility.

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► Vish Vishwanath, director of research and development for Sexing Technologies Inc., shared new research that has shown sex-sorted semen can achieve fertility rates comparable to that of conventional semen.

A new process in sorting semen has alleviated some of these issues (see Fig. 2, page 147). Termed SexedUltra™, Vishwanath said it improves *in vitro* sperm characteristics compared with the XY method.

Preliminary trials have shown that SexedUltra has resulted in a pregnancy rate of 46.1%, compared to 41.6% in XY. Seeing these improvements and performing a few tweaks, he said, a newer version of SexedUltra improved pregnancy rates to 52.9% on 3,189 inseminations.

In dose-rate trials, SexedUltra did show a response to increasing the number of sperm per dose. Using 4 million sperm per dose garnered a 66.7% pregnancy rate, while conventional non-sorted semen containing 15 million sperm per dose resulted in a 66.5% pregnancy rate.

Vishwanath noted that this trial showed a dose response effect for the first time, and that conception rates were comparable with conventional semen.

From these trials, he explained that fertility loss in sexed semen is primarily due to the interaction between sex sorting and cryopreservation.

Since 1990, considerable progress has

been made in sex-sorting technology. From 1990 to 1995, he said only 10 straws of sexed semen could be produced from 1,000 straws of conventional semen. From 1995 to 2002, that improved to 50 straws of sexed semen per 1,000 straws of conventional semen. From 2002 to 2012, 1,000 conventional straws could yield 400 straws of sexed semen.

In the last two years, improvements in technology and semen-handling methods have shown that 1,000 conventional straws could yield 1,100 straws of sexed semen. The advancement in technology offers a lot of opportunity for genetic improvement, Vishwanath concluded.

Vishwanath spoke during Tuesday's ARSBC session focused on the future. Visit the Newsroom at www.appliedreprostrategies.com to view his PowerPoint, read the proceedings or listen to his presentation.

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Editor's Note: Comprehensive coverage of the symposium is available online at www.appliedreprostrategies.com. Compiled by the Angus Journal editorial team, the site is made possible through sponsorship by the Beef Reproduction Task Force.