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More information about sexed-semen applications at Trans Ova Genetics

Sex-sorted semen became commercially available to the cattle breeding industries in 2003. This applied technology has allowed breeders to increase odds of females from a small selection of bulls whose semen has been collected, sorted and frozen for artificial inseminations.

The technology and science behind sex-sorted semen was first discovered in the 1970's. It was then that a sperm-staining and sex-sorting procedure using a flow-cytometer was developed, though the first calf from this procedure was not born until the 1990's.

It is a biological fact that in the fertilization process, the chromosomes from the sperm cell (bull) determine the gender of the resulting offspring. The process of sex-sorting semen still involves a flow-cytometer, which uses a series of dyes and light rays to detect a visible difference in DNA content between sperm cells carrying the X chromosome (female) and cells carrying the Y chromosome (male).

The first step in this procedure is to dilute the semen sample to a lower concentration and stain the cells with a fluorescent dye. The semen sample is then sent through the flow-cytometer at 60 mph under a pressure of 40 to 60 psi. The fluorescent dye is intensified as the sperm cells pass through the internal laser beam. Because the X chromosome has more DNA material, these sperm cells subsequently emit slightly more fluorescence than cells with the Y chromosome. Detectors measure the amount of fluorescence and assign positive or negative charges to each droplet containing a single sperm cell. Charged deflector plates then split the single stream into three smaller streams. For example, positively charged particles containing the Y chromosome (male) sort one way, and negatively charged particles containing the X chromosome (female) sort the other way, while uncharged droplets containing multiple or undetermined chromosome sperm pass straight through.

Confirmed with thousands of calves born in world-wide research trials, this procedure separates sperm cells with approximately 85 to 90 percent accuracy. However, it is important to remember that delicate and efficient semen handling is essential to maintain optimal fertility for AI and embryo transfer. Of course, the gender-sorting process can reduce the overall fertility level that can be expected, compared to standard frozen bull semen.

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Trans Ova Genetics technology can gender-sort both fresh and frozen semen, which when used in combination with IVF, can produce gender-specific embryos.

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With recent, wide-spread introduction of sex-sorted frozen semen, cattle breeders can increase the chances of gender-chosen offspring. However, production of sex-sorted semen costs up to three times more than conventional semen production. For this reason, there is only a small number of bulls from which to choose. It also is important for a breeder to understand that the selection options for such semen is limited to the bulls specifically collected and sorted, and there is an inherent reduction in fertility.

However, more recently, Trans Ova Genetics has perfected techniques to "reverse sort" semen for specific gender probabilities. Offered exclusively through Trans Ova Genetics, the technology now offers the capability of thawing a unit of semen, and sorting it for use in IVF embryo production. Thus, cattle breeders now have the option to produce embryos from the sire of their choice, greatly increasing the chance for calves of the desired gender. Donor cows at Trans Ova Genetics can have their oocytes fertilized with sex-sorted semen from any world-class bull of which the breeder owns frozen units of semen. With sex-sorted semen yielding 85 to 90 percent gender accuracy, the resulting embryos from the IVF donor harvest will yield the same results.

Custom bull housing at Trans Ova Genetics' facilities in Sioux Center, Iowa allows owners of elite sires to temporarily house bulls for the collection and gender-sorting of their semen prior to freezing. This growing trend extends marketing opportunities to take full advantage of multiple advanced reproductive technologies.