

First Calves Produced From Predetermined Sex Technique

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and Y (male) sperm based on DNA content, using a technology developed by USDA scientists at the Agricultural Research Service.

The new artificial-insemination technique can result in pregnancies with only 200,000 sperm. The USDA sexing process currently yields about 400,000 sperm per hour of each sex, which is one reason researchers developed the technique to use lower numbers of sperm.

With the DNA sexing technology developed by USDA, researchers are able to shift the sex ratio of calves from the normal 50-50 to 80-90 percent of one sex or the other. Calves previously have been produced with sexed semen through in vitro fertilization; however, this procedure has little value for routine cattle production because of complexity and cost. Artificial insemination is widely used in cattle breeding.

Cooperators on the project, led by Colorado State Professor George Seidel of the university's Animal Reproduction Biotechnology Laboratory, included Charles H. Allen of Atlantic Breeders Cooperative and Lawrence A. Johnson, of USDA, Beltsville, Md. Atlantic Breeders supplied the bull semen and support, and Johnson's Agriculture Research Service lab provided the sperm-sexing technology, which has been patented by the USDA.

Johnson's team separated the X from the Y sperm by DNA content using a flow cytometer/cell sorter and laser technology. X sperm have about four percent more DNA than Y sperm. The sexed semen was shipped

by commercial air to Colorado, where it was used to inseminate cattle at Colorado State and also at DUO Dairy in nearby Loveland.

Twelve of the 15 pregnancies produced with this method to date are of the sex predicted at the time of insemination. All of the calves appear to be normal.

DUO Dairy co-owner Mike Dickinson and the dairy's resident veterinarian Meg Cattell became involved in the project because of the potential benefit to their operation. "Practical sexing technology would be of enormous value to our dairy," Cattell said. "We're always looking for ways to improve efficiency, and this research could help meet that goal."

Predetermining sex of calves allows cattle breeders to produce milk and meat more efficiently. For example, cattle producers could obtain females from the best cows in the herd to replace older cows as they age, and males for meat from the remainder of the herd because males gain weight more efficiently than females.

"Much more work is required to make this process commercially viable. One problem that needs to be solved is the large variability in fertility from bull to bull using these procedures. Our goal is to have this technology available for about \$10 more than the normal cost of a dose of unsexed semen, while maintaining fertility and availability of semen to cattle breeders," Seidel said.

This research will be presented in January at the International Embryo Transfer Society Meeting in Salt Lake City, Utah. For further information, contact Seidel at (970) 491-5287, Johnson at (301) 504-8545 or Allen at (717) 569-0413.

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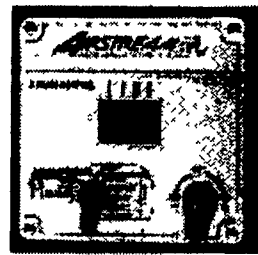
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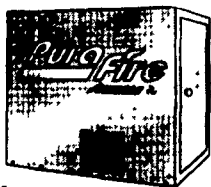
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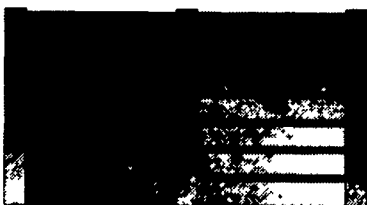


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