

Scientists Hail Birth of Test-Tube Calf

A test-tube calf, the first like it in Missouri and one of only a few in the world, was born Dec. 26, 1989 at the University of Missouri-Columbia.

The male, 85-pound, black-and-white calf has yet to be named by his foster parents, the scientists who made his special birth possible.

"He's perky and healthy," says one of those foster parents, John Sikes, MU dairy scientist.

"The calf is living proof that we are making progress in our efforts to solve reproduction problems and, eventually, clone much better cows."

In March of 1989, Sikes and his graduate student Tammie Schalue-Francis matured and fertilized an egg in a laboratory petri dish, then nurtured the young embryo seven days before it was transplanted by MU veterinarian Dr. Cliff Murphy into a cow he owns.

A handful of test-tube calves had been produced before this one, but few were given the same headstart.

"The unique part of our project is that we were able to get the fertilized egg to the blastocyst stage—a seven-day-old embryo—so that we were able to non-surgically implant the embryo into a surrogate mother," says Schalue-Francis.

"As far as we know, ours is only the second lab in this country to accomplish this procedure. The other was reported at the University of Wisconsin in early 1989."

Until the Missouri and Wisconsin scientists developed their techniques, scientists had run up against a "block" at the eight-cell stage. "For some reason, the embryo would start developing and would simply die at that stage," Schalue-Francis says.

"We got past that part by using a co-culture system—a media incubated with oviductal cells. That way, the very young embryo kept developing for seven days. Then we non-surgically transferred it into the surrogate mother."

Before Sikes and Schalue-Francis developed their technique, other scientists put the fertilized egg in the oviduct of a rabbit or sheep. Then, after a few days, the very young embryo was surgically implanted in a cow. To do that, the scientists had to make an incision into the flank of a cow and deposit an egg into the oviduct.

"The non-surgical technique is less

stressful to the animal, easier and less costly in the long run," Sikes says.

Non-surgical transfer means that scientists were able to use an artificial insemination "gun" to transfer the very young embryo to the surrogate mother. The tube containing the embryo was passed through the cervix, and the embryo was deposited into the uterine horn near the corpus luteum in the ovary. That's where the embryo is normally found when natural fertilization occurs.

"By depositing the embryo there, the



Missouri's first test-tube calf, born Dec. 26, 1989, and his Angus surrogate mother.

cow secretes a recognition hormone-recognition that she's pregnant," Schalue-Francis says. "That way, she is most likely to carry the embryo to term."

Schalue-Francis says the co-culturing technique she and Sikes developed will keep getting better as scientists perfect it. "I think it will become a valuable tool for researchers concerned about reproductive efficiency."

To get their calf to the embryo stage, Sikes and Schalue-Francis took an egg from an ovary collected at a slaughterhouse.

"We have no idea who the mother is," Sikes says, "but we do know who the father is. We used semen from a good, tested bull to fertilize the egg in a test tube before transplanting the egg in a surrogate mother."

Sikes and Schalue-Francis say they want to improve culture systems so that other scientists can clone identical animals guaranteed to be better milk producers. The cloning technique would also be valuable to beef and pork producers, guaranteeing genetic uniformity and taking the guess work out of livestock breeding.

The procedure used to produce the Missouri calf is much like the one used to produce the first test-tube baby in the early 1980s. The only difference is that in humans, the fertilized egg is only developed to the two-cell stage before it is implanted into the mother's uterus.

With MU's technique, they don't have to use a rabbit to incubate the young embryo. Also, they don't have to perform surgery to impregnate the surrogate mother. It's just easier on the cow all the way around.

In a way, the Missouri calf has five parents: Sikes, Schalue-Francis, a mother (the egg), a dad (the sperm), and the surrogate Angus cow that carried him to term.

"The birth of this calf is a good sign that we are on the way to solving animal reproduction problems that now cost beef and dairy producers millions of dollars each year," Sikes says.

"With test-tube fertilization, cloning and other techniques, we hope to find ways to greatly reduce embryonic mortality and improve livestock production efficiency."

For example, several clones from the mating of top-quality animals could be produced in a laboratory. Then the clone could be tested while the rest are kept frozen. "If the tested clone proved good enough, we could thaw the rest and have a whole herd of super producers," Sikes says.

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