Which came first: cow or calf?

Embryo transfer technology being used to upgrade herds

FERGUS FALLS, Minn. (AP) —It gets a little confusing, but sometimes it's fun to play mental games.

A cow bears a calf, except the cow isn't really its mother — it's the calf's grandmother. And although the calf was born just today, its sire was shipped for slaughter five years ago. The mother was sold to another farmer, also years ago.

How is it possible for a grandmother cow to bear its own grandchild, and for the parents to be somewhere else at the time of birth?

The answer is embryo transfer technology, referred to as ET, and Fergus Falls veterinarian Ken Nordlund is one of the pioneers of this relatively new cattle-breeding method.

The process involves transferring the fertilized eggs of cows that have proven to be superior milk producers into the ovaries of other, inferior, cows.

The idea is to improve herds by getting as many offspring as possible from superior cows, while using inferior producers as surrogate mothers.

According to Nordlund, one of the earliest successful ETs in the United States was performed in Otter Tail County in 1972.

"When that first calf was born, it was enough to make the *Wall Street Journal*," Nordlund said. "But the method was a lot different back then."

The first ETs involved major surgery on both the donor and the recipient cows. The cows were shipped to a veterinary clinic, put under anesthesia on an operating table, and the fertilized embryos were removed and transferred surgically.

Nordlund performed his first successful non-surgical ET in 1979 and another in 1982. Since then, he has performed dozens of succesful ETs, resulting in more than 150 births.

The non-surgical method involves washing the embryos out of the donor cow's ovary with a phosphate-buffered saline solution.

In effect, the solution is pumped into a cow's ovary and then pumped back out again. When the fluid comes out, the microscopic embryos come with it. Nordlund then searches through the fluid with a microscope to locate each embryo.

Because the cow has been treated with a fertility drug, the ovary will usually contain more than one embryo. The average is seven, but some cows have produced more than 30. This is called "superovulation."

After they have been separated from the fluid, the embryos can either be placed in a recipient cow or frozen for later use.

Performing an ET costs from $250 to $750, Nordlund said. Much depends on how many successful births are produced each time it is done. The more successful births from each attempt, the lower the cost.

"We're getting more efficient all the time," Nordlund said. "Out of the first 100 transfers I did, 23 of them were successful. Now we have about 65 percent turn into pregnancies, and 45 percent of the frozen embryos turn into pregnancies."

Freezing embryos has only come into use within the past three years, Nordlund said. It's a valuable technique because it prevents the loss of embryos that can't be transferred to donors immediately.

If, for example, a cow produces 30 embryos, there will not likely be 30 donor cows available. The estrus cycle of the recipient cows must coincide with that of the donors. Inducing estrus in enough cows at the proper time is tricky business and not always successful.

"The only problem is that there is a significant loss when an embryo is frozen," Nordlund said. "Freezing an embryo places a lot of trauma on that mass of cells. A sperm cell can be frozen unharmed relatively easily because it is so small. But an embryo already contains about 164 cells and ice crystals can form on them and destroy them."

To prevent them from being destroyed, Nordlund says embryos are treated with a glycerol solution. But the glycerol must be removed from the embryo before it is transferred to a donor.

Because ETs are becoming more simplified, it is becoming economically feasible for more farmers to have them done. But Nordlund says the operation is still only for the best of cows.

"A calf should be worth from $1,500 to $2,800 each to make it worthwhile," he said. "This is something that is only for superior cows, there's no question about that."

Work part of the education at North Carolina college

SWANNANOA, N.C. (AP) — Students at Warren Wilson College can do more than analyze a Shakespearean sonnet or ace the law boards — they also can breed pigs, install a sink or replace a truck valve.

"Everyone has to work," said Dr. Reuben Holden, retiring president of the small Presbyterian-related liberal arts college near Asheville. "It has a very leveling effect on the whole campus.

"The effect is that the students go out into the world with a good solid educational background in liberal arts, plus the best of two worlds . . . they can do things with their hands."

The college's 470 students work 15 hours per week in exchange for room and board. The 67 campus work crews include auto mechanics, foresters, computer programmers, plumbers, photographers and admissions recruiters. The farm crews provide fruits, vegetables and 70 percent of the beef for the campus dining hall.

In addition, each student must complete a 60-hour non-credit service project. Many complete their service in Third World villages in what Holden calls a "mini-Peace Corps." Others go to their hometowns and, for example, help build a new church.

Holden said the students' education was further broadened by the makeup of the student body. About 12 percent come from 22 foreign countries; and while the college was founded in 1894 by the Presbyterian Church, it has students from 21 different denominations, including Hindu and Buddhist.

"We don't require chapel anymore, but we still feel strongly the need for a basis of values in any education," Holden said.

Some of the graduates go into social work, but many also go into business, law and medicine.

Student life is not all studying, working and serving. Holden said many students take advantage of the recreational pursuits offered by the Blue Ridge Mountain setting, such as camping, hiking, boating and cave exploration.

Many faculty members have come from larger universities — particularly Yale, where Holden was a secretary before he came here 15 years ago.

"Here they can do their own thing — set up courses of their own, using our farm and forests and not having to worry about a lot of bureaucracy," said Holden. "The drawing power of a little college is that they can play an important part in a small community."

Researchers seek to grow crops in sand

YUMA, Ariz. (AP) — Sand lies in a 90-foot-deep layer over the Yuma Mesa — not very promising farmland. Yet, with the right kind of irrigation and fertilizer, that sand can be prime agricultural land, researchers say.

Two University of Arizona soil scientists say they've demonstrated that it's possible to get commercially acceptable yields of vegetable crops on Mesa sand.

Dr. Bryant Gardner and Robert Roth, Yuma Mesa Agricultural Center, use self-moving irrigation systems, careful management of the nitrogen fertilizer levels and a special, modified deep chisel plow to grow a range of vegetables.

They've tested asparagus, broccoli, cabbage, carrots, cauliflower, cucumbers, lettuce, potatoes, sweet corn and watermelons.

Roth says that the Mesa consists of 100,000 acres of fine, river-bottom sand.

Some of the land is being used as a bombing range.

Only 25,000 acres are within an irrigation district, with some of the land developed for raising citrus trees, jojoba and asparagus.

"The most important result of our research is to show that we can get the same yields of high-value vegetable crops off marginal land as most growers get from prime agricultural land," Roth says.

Furrow or flood irrigation is inefficient on this deep sand, the soil scientists say.

Water sinks so quickly into the sand that an excessive amount has to be applied to reach from one side of the field to the other.

Nitrogen fertilizer follows the water — straight down.

Self-moving, low-pressure sprinklers, spray or drop hose techniques save energy and make both water and fertilizer use more efficient.

Their experimental sprinkler irrigation system is a self-moving lateral design.

With light, frequent irrigations, the soil stays moist during seed germination.

Roth and Gardner say that seeds can be planted shallowly.

Stand establishment under this sprinkler system is comparable to that on heavier, flood-irrigated soils, they say.

Program to train deputy officers

FORT LAUDERDALE, Fla. (AP) —The Broward Sheriff's Office has more than 400 correctional officers to handle detainees and prisoners at three county lockups. Although they are deputy sheriffs, they do not have arrest powers and do not all carry guns.

A pilot program is changing all that. Called "cross certification," the program was initiated this year by sheriff Nick Navarro to bridge the separation of correction and road patrol officers and provide a larger complement capable of serving in either capacity whenever an emergency arises.

The first class of 17 selected corrections officers was graduated recently after 220 hours of additional studies and training to qualify them as road patrol deputies, complete with arrest powers.

The added training provided the deputies emphasizes search and seizure, criminal law, patrol techniques, crimes against property and person, accident investigation, firearms, emergency medical response and rules of evidence, explained Commander Tom McInerney, in charge of training for all deputy sheriffs.

"Under certain conditions — hurricanes, riots or a shortage of road deputies — the sheriff can call on these people to help out," added McInerney.

Something else for the new graduates to look forward to is six weeks of field training with seasoned road officers, McInerney said.

After that, they return to their regular duties.

Targeted for the program are 53 jailers now assigned to transportation, security, booking and the emergency response team, Navarro said.

Apart from enhancing the qualifications of detention officers, cross certification is a morale booster.

"It gave me a better understanding of what the road patrol does," said Debra Reggio, one of the graduates, dubbed "criminal justice specialists."

Having arrest powers could prove useful whenever she's delivering detainees and prisoners to courts, hospitals and other facilities, she said.

"When something happens out there, the public looks at the uniform and the gun and expects you to do something," she said.

Before attaining her new title and without arrest powers, any action she might have taken could have been a liability to the department.

Al Demarest, a retired Army major with 20 years experience in the military police, was in the first graduating class.

"I've got more credibility now," Demarest said. "I'm better equipped to do the job and can explain road patrol problems to others."

Reggio and Demarest admit the additional training and certification have enhanced their opportunities for advancement.

However, neither expressed a desire to leave detention work.

Navarro and McInerney are already planning to reverse the cross certification program to qualify road officers as detention deputies.

"Why not?" observes Navarro. "It would give us tremendous flexibility."

Training for detention deputies includes state and federal rules and regulations for corrections facilities, sanitation, inmate classification and institutional disturbances.