



# Multiplying the Best



Colorado Genetics Inc. veterinarian technician Deb Rest checks an embryo at the lab in Loveland, Colo.

*Properly managing donors and recipients will make for a successful embryo transfer program.*

by **Heather Smith Thomas**

**I**n today's cattle industry, there are more and more purebred breeders using embryo transfer (ET) in their herds. ET has been a part of bovine reproduction options now for more than 50 years.

An embryologist at Colorado Genetics Inc. in Loveland, Colo., Darrel DeGrofft, DVM, says the first ET calf was born in 1951. "ET has been used commercially in North America since the early 1970's, with embryo freezing technology following during the 1980's," DeGrofft says. "The use of ET has several benefits for the producer as it allows the cattle breeder to more rapidly gain overall genetic quality in a herd. We can collect multiple embryos from a superior purebred cow several times during the year and greatly increase the number of offspring from that cow."

Using ET is a way to more quickly multiply the best genetics in the herd, creating more replacement females or bulls to sell or some extra embryos. As long as the donor cow is a good producing individual, a

person can collect a lot of embryos from her within a few years.

It's also a way to more quickly increase calf numbers in a small herd. "We have a client right now who is considering buying a few donor cows. He's been using frozen embryos but now he'd like to collect his own and use them to increase his herd a little faster," DeGrofft says.

"When breeding the donor cows, a person can use a different sire for each ET procedure, if desired, to get varied genetics either to sell or to keep in the herd. You should be selecting donor cows of superior genetic quality, and selecting a mating that will have marketability and economic worth. The sale of embryos is very common today. We have clients who frequently buy frozen embryos from other people, and we transfer those into their recipient cows," he says.

DeGrofft started working with ET in 1973 and has been doing so ever since. He says many things have changed in this industry but some things have stood the test of time and are still very valuable today — one of these is nutrition.

### Donor and recipient management

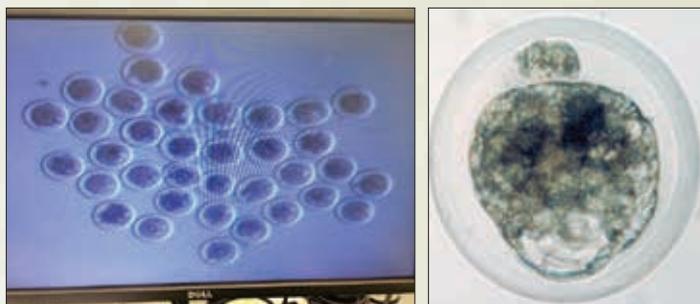
Adequate energy, protein, minerals, etc. are crucial for donor and recipient cows. "We like to see the donor cows and recipient cows in a body condition score of about 5.5 to 6. We don't like to see the donor too fat. If donor cows get up to a body condition score of 6.5 or higher, we see a decrease in viable embryos that can be collected from those cows," DeGrofft says.

"There is good reason for that; there is research data to show why fat cows tend to have reproductive problems. If cows get too fat they have hormonal problems, metabolic problems and a decrease in reproduction."

Recipient selection and management are much the same as for donor cows. "We like to use early calvers that are at least 65 to 70 days post-partum before we consider using them as recipients. We prefer middle-aged cows, with good dispositions. The producer will have to put those cows through the chute to prepare them to receive an embryo, and may not want cattle that are difficult to handle. When they calve, a person also wants cows with good dispositions, making it much easier to handle the calf, ear tag it, etc.," he says.

The recipient cow should be reproductively sound with a good calving record. "We wouldn't want to try to use a cow that had been open for a couple of years. We also want these cows to have adequate milking ability, and we try to keep the nutrition the same as the donor cow before we transfer the embryos."

DeGrofft also uses Multimin 90, the injectable trace mineral product, for all of the donors and recipients, along with the mineral ration the rancher is currently using. "We've been doing that for about 12 years and there is a data to show that this can result in an increase in embryo quality and pregnancy rate. We



Pictured (l) are multiple embryos recovered from a donor cow and a single embryo as an expanding blastocyst (r).

will be involved in a research study this year, to further evaluate embryo quality and production with use of this trace mineral product," DeGrofft says.

From a nutrition standpoint, the recipients need an adequate diet. "We tell our clients that they need to maintain a very similar nutrition program after the embryos are transferred for about 30 to 40 days, if possible, in order to maintain early pregnancies. This can decrease the possibility of early embryonic losses. Research has substantiated this factor, and we personally have seen this. One of my biggest fears is when heifers have gone through an AI (artificial insemination) program in a feedlot and a few days later are turned out on a little bit of green grass in April that is very low in nutrition. We know that they will suffer some pregnancy loss. The heifers need to be on the same nutritional level for 30 to 40 days to help maintain that early pregnancy, and the same applies to recipient cows," he says.

It is important to test the feed and water in order to balance the ration properly for minerals, protein and energy. "We find areas from ranch to ranch that are too high in selenium or the rancher (may be) feeding something that's high in nitrates or selenium, or the soil may be high in molybdenum which ties up copper. Even when people buy the same mineral ration that

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Embryo transfer is a valuable tool to quickly multiply a herd's best genetics.

their neighbor does, it still may not be the right balance for their own soils and feed,” he explains.

DeGrofft says he and his staff have utilized a consulting nutritionist for more than 15 years to help evaluate rations from information each client provides. “Over the years, we’ve found a tremendous variability as we travel to about 10 states to do ET work, and we find big differences in some of these locations. If they don’t test the feed and water, they won’t know what they need,” he says.

He also asks that clients have an adequate identification system for the recipient cows. “Once in a while we run into some that don’t even have an ear tag. We suggest that they have two ear tags, one that they can identify when the embryos are being transferred into these cows, and another ear tag identifying the mating. It is very important to have at least two forms of ID and some people even write down the number of a metal tag they might have in the ear, like a brucellosis tag, or another metal clip tag, using it as a back-up form of ID in the event that the recipient cow loses both ear tags,” he says. That way there are no questions about the genetics of the resulting calf.

### **Pregnancies**

When embryos are collected from a beef donor cow, the average number is about six to six and a half embryos per flush on a cow and about three or four on a virgin heifer.

## **International market for embryos**

An embryologist at Colorado Genetics Inc. in Loveland, Colo., Darrel DeGrofft, DVM, says there is a larger demand every year for frozen embryos to sell to other clients or for export.

“We get inquiries from various countries in South America, Europe, Russia, Canada, Australia, New Zealand and others for frozen embryos. As we look at the international scene, there is an increasing demand for U.S. genetics,” DeGrofft says.

Embryos are a bio-secure method for exporting seedstock genetics. A person can ship embryos even when importations of live animals are prohibited. “We know of no known diseases that have been transmitted from the donor cows to the recipient cows by exporting embryos. There are strict regulations for preparing embryos for export and there is virtually no risk for disseminating disease,” he says.

“When a producer is selecting semen for a mating to produce embryos, if they may later want to export embryos internationally, they need to use CSS (Certified Semen Services) approved semen. They also need to use a company that has an accredited veterinarian in the American Embryo Transfer Association to collect and prepare those embryos for export,” DeGrofft says.

Shipping embryos to other countries has advantages over sending live cattle, besides disease issues. “The embryo transfer calves are born and raised in the local environment so they are often much better adapted than any animals that could be sent from the U.S. to a foreign country.” **HW**

“About 30% of the donor cows we flush do not produce viable embryos,” DeGrofft says. “Statistics indicate that about 70% of the embryos collected are from about one-third of the donor cows. Some donor cows produce embryos very well and some do not. The owner has to decide how long to continue working with a cow without acceptable results, or just put her back in the herd and let her raise just one calf each year, and select another individual to use as a donor cow.”

He says that most people ask about pregnancy rates. “Over the past 30 to 40 years, the factor that most affects pregnancy rate is the quality and management of the recipient cows,” he says. “The donor cows are usually looked after very well and the embryos we freeze are very good quality; the freezing process has been the same for 30 to 40 years. We can show data, not only from our company but also from others, that the important factor is the recipient cow — her nutrition, age, reproductive soundness, and how she is managed. In a good herd, we should be getting a pregnancy rate of 55 to 65% depending on whether they are fresh or frozen embryos.”

Fresh embryos give a slightly higher pregnancy rate, 5 to 7% more than a frozen embryo pregnancy rate. “We anticipate 55 to 65% but have had clients we’ve worked for over the years that get 65 to 70% because they understand the management of the donors and the recipients. Due to their good management, we get better results — not so much because of what we do, but because of what they do,” he explains.

Costs vary amongst companies, and breeders should contact their ET company to look at the costs that might be involved, whether they want to collect embryos to be frozen or transferred immediately into the recipient or whether they want to do IVF (in vitro fertilization) using sexed semen.

Not as many people in the beef industry (compared to dairy) are using IVF or sexed semen for producing embryos. “Most of the producers we work with can use both the heifers and the bull calves, because they tell us they can place a heifer back into their herd, or a bull for their annual bull sale. We don’t often get requests to use sexed semen for any of the donor cows,” says DeGrofft.

“The use of sexed semen creates a different scenario, as we have to use a specialized protocol in order to utilize sexed semen properly in a donor cow, or an AI project. It’s not the same as when using conventional semen, primarily because of the reduced number of sperm cells in a straw of sexed semen,” he says.

Colorado Genetics does all of its reproductive work on the producer’s farm or ranch. “The producers therefore need to evaluate their facilities, and the labor to put the cows through the ET program and synchronize the recipients,” DeGrofft says. “Timing is very important, so it is crucial that they follow the superovulation protocol correctly. An experienced AI technician is also required for breeding the donor cows.” **HW**