

Practical Applications of Embryo Transplanting

C. Ancel Armstrong, Ph.D.
New Breeds, Inc.
Route 5
Manhattan, Kansas 66502

The embryo transfer program is a utilizable management tool which recently became available to the dedicated seedstock breeder. In my opinion the success or failure of embryo transplant revolves around him.

Well then, what is a seedstock breeder? To me he is a dedicated, egotistical individual determined to produce a product that his (inferior) fellow breeders can use to produce better commercial cattle or upgrade their own seedstock herds with. He is rarely successful financially, sometimes his heirs are rewarded for his efforts.

We have always had a good supply of these people around and embryo transplant has been around for at least two decades. Then how come it was only developed within this decade? The reason is simple. There was not sufficient interest to fund it until the new breeds were introduced into North America ten years ago. The new breed organizations funded the development and research it took to make it a worldwide reality. And, yes, our company has paid its tuition to this institution because its president is one of those egotistical seedstock breeders!

New Breeds, Inc.'s experience reveals that embryo transplanting is a good, practical management tool when coupled with good animal husbandry, shrewd merchandising, acceptable phenotype, and superior genetics. That sentence says it all. Let's review what was just said.

Good Animal Husbandry: Well, you professionals know what that consists of for you make your living helping administer good husbandry or by treating sick cattle where poor husbandry is practiced.

Acceptable Pnenotype: This largely depends on the trend in the cattle industry. Color, height, muscle or lack of it, legs and feet, capacity, udder, and breeding soundness. I must mention the show ring because this segment is willing to help finance the embryo transplant venture.

What about *superior genetics*? This is the one that excites me the most because the beef cattle industry has not measured or utilized superior genetics in seedstock production until recently. (In fact, it has not even been understood.)

Let us look at the economically important genetic traits that can be measured through progeny testing programs:

First, calving ease. There are two sides to this—the

bull and the cow. *First the bull.* The actual birth weight is the best predictor, but who wants to weigh a messy newborn calf in a snow storm or the rain with a mamma cow snorting in your hip pocket? The seedstock producer must weigh that newborn calf if he is to measure this trait.

Second, the growth traits: weaning, yearling, and carcass. Weaning is easily measured providing you have your cows identified and aren't too lazy to borrow a scale and run the weaning cattle across them. This trait is the most popular trait to measure and very useful if you sell weaning calves. This trait does successfully measure a mother cow's milk production.

Yearling weight is an excellent measure of growth and all seedstock bulls should be measured for this trait.

Carcass is an important trait economically and one that is easily measured, providing you forget the hocus-pocus of quality grade. The faster-growing, leaner-carcass cattle are definitely the most economical to produce and research has proven that cattle that are hard fed for 60-90 days eat as well as those sloppy fat cattle. So when you measure growth, you measure carcass profitability.

Now let us discuss the maternal traits. First, the daughter's calving ease. The daughters of a bull are equally important to calving ease as the bull they are bred to. In the ASA national sire evaluation program we find 20% difference in calving ease of first-calf heifers among bulls with thousands of records. Therefore, the measure of the sire's daughters for calving ease could be the most important economic trait we deal with. But only recently was it measured.

Next let us discuss the daughter's first-calf weaning weights—an important economic trait and one easily measured by weighing calves at weaning time. This is used by most good seedstock producers.

What about shrewd merchandising? This is as important as any measurable genetic trait and unless it is done successfully the embryo transplant program is guaranteed to be an expensive disaster.

Based on \$1,500 transplant cost and \$400 cow salvage, it will cost about \$2,000 to \$2,500 to develop a seedstock yearling by embryo transplant and unless you can exceed \$2,500 average on your embryo transplant calves you are in the income tax evasion business or broke or both.

To give you an example of this, last year I was beating the bushes for the first double-poled pedigreed Simmental bull. I ventured on to one of your professional contemporaries in one of Kansas' neighboring states. "Yes," he had four calves from embryo transplant and some of the oldest double-poled. I looked at two of the best. They were on their Hereford recipient mothers. These cows did not appear to have enough milk to feed a calf and the pasture they were in could not support them, let alone support their calves. I trust this party has a good veterinary practice for he has his deductions lined up for 1978.

To sum up merchandising, we must average \$3,500 per calf, otherwise I question the financial practicality of this practice. (But that probably will not keep the seedstock producer, including me, from using the program.)

Now let us talk about our production results. Our results are reported to you very simply. We have found it takes a year of a donor cow's life to produce six embryos which eventually result in live calves and live calves are all that count for us.

Further, our records indicate that only one out of four cows respond adequately to super-ovulation, making this average possible. A further review of our records reveals that 40% of the total eggs recovered and transplanted resulted in live calves. These results are based on both surgical and non-surgical techniques. Results can be tabulated many ways depending on how hard you cull your data, eggs, donors and recipients.

Now let us talk about application—how we apply the embryo transplant program in NBI's operation. First, our primary business is the wholesale semen business in the new breeds of cattle. Therefore, we use the embryo transplant program to produce a number of young bulls to select from for progeny testing programs. To background today's successful bull in AI, he is selected from about 8 starters. Today it costs you about \$100,000 to develop the 8 bulls, then you cast aside 7 of these bulls. Hence the need for starting with phenotypically and genotypically superior bulls. By doing so you may be able to stack the odds in your favor.

How do you do that? First the dam and maternal granddam must be sired by bulls that rank in the top 1-2% of the breed according to the national sire evaluation programs and they must be the right kind.

Next, you select several sires which also rank in the top 1-2% of the breed based on national sire evaluation programs. Then make the best mating phenotypically and genotypically you know and pray for luck.

After the litters are born and hopefully there will be litters, we decide whether or not the mating was good enough to sample in the AI program. If that decision is positive, we apply additional performance pressure and select for the phenotypically superior litter mate. Then we go on to the next step and commit ourselves to selecting a full sister to the bull selected for the AI program and commit her to the embryo transplant program.

Lots of eggs in one basket? You bet! But if you win, look at the time and generations you have skipped!

I have really philosophized quite enough, but I cannot help but leave you with my thoughts on the future role of embryo transplanting. First, cost. This must come into line and has compared to a few years ago, but it must come into line with the prices of purebred cattle if embryo transplanting is to be a long-lasting, practical tool in cattle management.

On-the-farm application may be part of the answer. But it has to work and work successfully. No one can afford to feed and hold donor dams and recipient cows open unless the results are financially rewarding.

On-the-farm embryo transplanting will take expert skills by the seedstock producer as well as the embryo transplant professional.

Non-surgical implanting needs to be perfected and it will be. This procedure can save time, allow the seedstock breeder to better utilize his recipient cows and lend itself to greater use in beef and dairy seedstock operations.

What about freezing the embryos? This one is good in theory and may work in special cases. I am not sure it is practical. First, we know in AI that we lose about 50% of the sperm cells after freeze, therefore I would expect the same to apply here. Then, theoretically only 1 cow in three or four which you would transfer into would successfully drop a calf. However, if you want to explore this even further you could determine sex by taking a cell sample then match the embryos up for twinning? **Practical financially? I doubt it; but as I related earlier, seedstock producers usually don't die rich!**