

## Embryo Transplant

*The response was overwhelming! Last Spring ANGUS JOURNAL sent letters to a number of breeders throughout the country asking their opinions on either embryo transplant or birth weights. An unbelievable percentage answered.*

*And those responding obviously gave their chosen topics careful thought, then took time out from busy schedules to put those thoughts down on paper. For that ANGUS JOURNAL extends its thanks—and because of that each comment deserves attention.*

*We are starting here with comments on embryo transplant; Angus breeders pondering the subject would do well to read what their contemporaries (many with first-hand experience) think about this relatively new, admittedly expensive and sometimes controversial practice.*

*Because of the number of responses, those dealing with birth weights will appear in a later issue.*

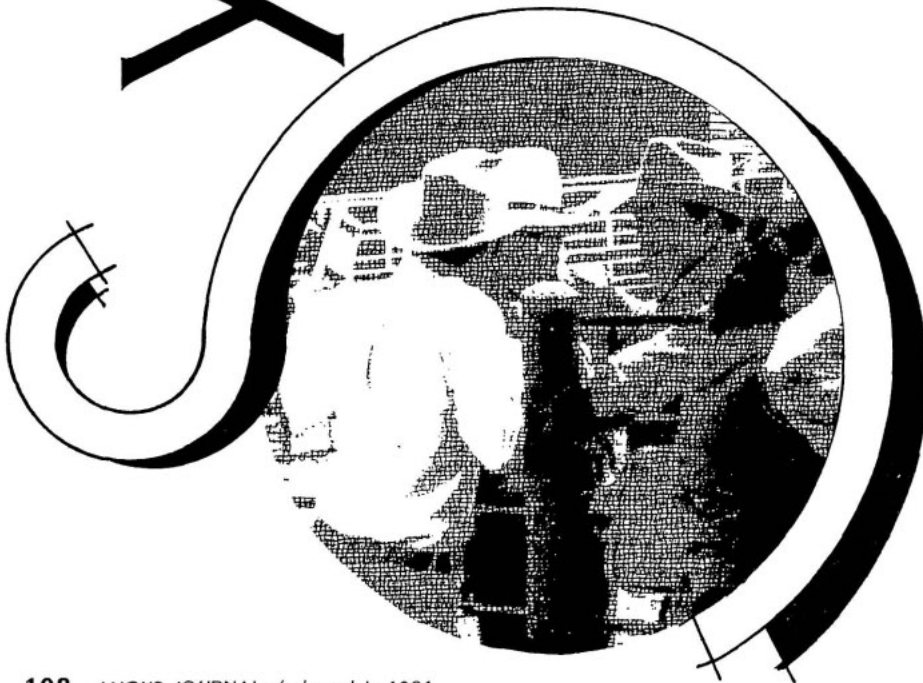


**Bruce Conover / Weir Stewart**  
**Sir William Angus, Hillsdale, N.Y.**

At this point in time, a significant number of Angus breeders have participated in embryo transfer programs with varying degrees of economic success. A great deal of importance has been placed on securing the outstanding females in order to make the program work financially. This we have found to be a very basic requirement. Moving beyond this fundamental necessity, several observations of interest have come out of our experience of having approximately 400 embryo transfer Angus calves in the past four years.

First of all, there are some misconceptions that should be dealt with. The belief that "a mating of an outstanding cow and an outstanding bull through the use of embryo transplant will always produce a group of outstanding progeny" is just not true. The progeny will be above the breed average and probably above the herd average, but there might or might not be a truly superior calf in the group. The law of genetic probabilities is that roughly one out of seven progeny has a chance of receiving the best genetic material available in a particular mating. The function of embryo transfer, therefore, is to dramatically increase the probability of producing the outstanding individual of that mating; but in the process, the likelihood of producing the bottom-end calf as well as five calves above herd average must be considered in the economic viability of the program.

The second misconception to be considered would be, "I have four great cows to be donors in my embryo transfer program; I can use any of the top 10 bulls whose semen is readily available." One worthless calf from a particular mating represents a financial loss. Twelve worthless calves from an embryo transplant flush can spell economic disaster. The eye and intuition of the master breeder take on new importance when one participates in a program of embryo transplant. All the significant factors such as quality, uniformity and industry ac-



ceptance of a sire's calves will impact on the success of the program.

The beef breeds have been rotating their herd sires at a fast clip during the past six years, and that means there are a lot of unknowns in every bull's genetic background. Selection of the proper herd sires takes on new importance.

Our experience at Sir William Angus indicates that embryo transfer has been profitable to us and to our customers. We have substantially increased the number of good cattle in the herd and yet have been able to sell a significant number of our very best animals. We were fortunate to have a number of very good cows to start with so have been in a position to spend most of our available money to buy herd sires. We attempt to buy bulls whose semen has not and will not be available on an industry-wide basis.

The high cost of embryo transfer requires that the breeder sell bull calves at a high enough price to cover the \$2,100 transplant cost. We have been using Holstein heifers as recipients and find that they give about the same amount of milk as a mature Angus cow. There is a problem, however, in getting them to give enough milk from the fourth month on because they are not so efficient as an Angus cow and therefore require supplemental feed to maintain adequate milk supply.



**Ken Conway**  
R&J Ranch  
Briggs, Texas

Embryo transfer won't work! These are the words many breeders used when we were looking into the possibilities of transferring four years ago. The same negative responses were heard several years ago when artificial insemination was just being developed. The success of embryo transfer during the past two years has proven that it is here to stay, just as artificial insemination is. It is one of the single most important management tools ever to be developed for improvement of the purebred seed stock industry.

The results of embryo transfer are truly exciting to anyone who is trying to breed and improve purebred cattle. When you take a truly superior female and are able to mate her to several different top sires and get multiple offspring from her in a single year, then are able to quickly build on the next generation by taking the top daughter and having multiple offspring from her by several bulls, the amount of breed improvement that can come from one superior female can be truly unlimited.

The problem now with embryo transfer is not whether it will work but if you as a breeder should use it and the selection of which superior individuals should be transferred. The first thing a breeder should analyze is if he has the ability to merchandize the embryo calf for more money to cover the added cost of embryo transfer. Then for a breeder to be successful, it is very important that the individual transferred be really a superior female and not just the best in his herd.

Embryo transfer is here to stay. All we breeders need to determine is how we can best utilize it as a management tool for breed improvement. We are just seeing the tip of the iceberg on the unlimited horizons of embryo transfer.



**Billy Yarbrough**  
B&L Ranches  
Allen, Okla.

Being relatively young in the Angus business, B&L Ranches chose the embryo transplant program for two major reasons.

1. We started our herd with the great Biffle females with the intention of utilizing them to their greatest potential. With the embryo transplant program, we are no longer limited to those females and their annual calves. Instead, we now are able to produce enormous calf crops through the embryo process. In addition, we are confident that these calf crops will be able to follow and fit into the profile of our females.

Also, by allowing already proven commercial cattle to carry these previously fertilized eggs, the embryo transplant program is allowing B&L's females a longer calving potential. In addition, with so many bloodline identicals on the ground in 9-12 months, we are able to determine much more readily which bulls will best fit into our breeding program. B&L sees this process as not only preserving our prized and proven females but also as reducing part of the guess-work in our breeding program.

2. It is believed in policy at B&L never to let a female calve before 30 months. We believe this extended period ensures total growth and soundness.

Therefore, the second and most profitable reason we depend on the embryo transplant program is that it allows us to have 15-20 calves on the ground before we normally would breed a heifer if she were to carry the pregnancy full term.

In short, with the embryo transplant program, we at B&L are not only able to produce the bloodlines of our choice but also are able to start this program 14 months after our females are on the ground.



**Samuel S. Ambrose, M.D.**  
ScratchAway Farm  
Newnan, Ga.

I applaud the scientific community for developing successful embryo transplant procedures, and all breeders should thank congress for the tax climate that rapidly propelled the techniques from the research laboratory to the level of a proven field procedure. Undoubtedly, embryo transplantation will prove in time to be a major advance in speeding the spread of desirable traits through our cow herds.

Unfortunately, as judged by prices at some recent sales of recipient cows, current expectations for the progeny may far exceed capabilities of the procedure. Full brothers and sisters are not genetically identical, as any mom and pop proven by multiple progeny will attest. Embryo transplantation is not and will not serve as a "cookie cutter" for cattle production.

For maximum effectiveness and credibility, the technique should be reserved for progeny-tested bulls and cows that have progeny-proven outstanding traits and progeny-proven absence of genetic defects. Hopefully, responsible breed associations will address this problem quickly and forcefully.

Embryo transplantation has suddenly moved the nurse cow from the back to the front pasture, made her acceptable, and effectively pulled an end run on current performance programs and show classes. How are we to fairly compare these cattle before and at maturity to their siblings and herd-mates that did not enjoy the possible advantages offered by a heavy-milking dairy cow surrogate mother? In turn, without the boost from a surrogate mother, will their progeny in years to come be a disappointment?

The effect of surrogate mothers on the immune systems of their progeny is not fully known. If the immune systems are impaired, susceptibility to disease may be altered.

When the promotion has calmed and quiet appraisal of results are in, embryo transplantation will find its proper place for the genetic improvement of our cattle.

**Fred Frey**  
Twin Oak Farms, Quarryville, Pa.

I believe embryo transplants will do more good for improvement of the Angus breed (for that matter, any breed of livestock) than anything we have used in the last 20 years. With the tools we have today to identify those very superior cows and bulls and then

mate them properly (and this may be the whole secret), each breeder and every farm will be thinking or looking at those super cattle and the mix of bloodlines differently. But that is as it should be. That is what made our breed what it is today. Not all matings are going to turn out as planned, but others are going to be much more than expected.

I believe it will be four to eight years before we really can appreciate the results of embryo transplants, for it will be that long until the transplants have progeny and grandprogeny. Only then will we know how good a job we did in selecting and planning the whole program.

In our own case, in 1978 one super-ovulated transfer result was three bulls and one female. One of those bulls is Continental. This is now 1981, and his progeny will be dropped all over the U.S. and Canada, but we still have to wait two more years to really know how good or bad they are.

On our Princess, from December 1979 to February 1981—about two years—results are 30 calves from 40 transplants, 10 bulls and 20 females. Either we were a little lucky or we planned it right, because there isn't a dud among them. Ask anyone who has seen them.

In summary, embryo transplants are not for everyone nor are all the cows being transplanted suitable for great breed improvement. The bottom line will even it all out as will breeder acceptance. It also will require more patience than most of us have.



**Kevin E. Swaim**  
Shadymere Farm  
Marshall, Ind.

Being a participant in two separate transplant programs, one on the farm and one off, I've spent a fair amount of time considering what I think are some of the pros and cons of transplanting.

If done conscientiously, it can be one of the most innovative and progressive production tools available to the purebred breeder. Although some may disagree, I feel it can be of greatest benefit to the small serious-minded breeder who doesn't have the genetic or monetary ability to put together numbers of truly superior females. With ova transfer, it's possible to take one or two such females and become much more competitive with a larger more lucrative breeder. Also depending on it's trend, it may become an even more important consideration simply to stay abreast in the registered market and show ring competition.

In our program, the most important criteria in picking a female for transplant is genetic predictability and consistency. It's rather naive to assume you will produce one special calf that will pay the bill for the rest. This will happen very seldom; therefore, it is very important that the donor cow be consistent in production of top calves. Selecting a donor cow with superior individuality and desirable pedigree is also important when considering the merchandising and/or replacement value of the calves.

The greatest advantage transplanting offers our operation is the ability to use our top one or two cows as a nucleus from which to build a herd unit of genetically similar and superior females in a relatively short time. It should also increase the average quality of our calf crop more rapidly, allowing us to market better breeding stock and at the same time keep back better replacements.

Other benefits we foresee are production of herd sires to use in our own program and greater competitiveness in the show ring.

Like all innovations, there are some drawbacks. Even though embryo transfer is cheaper than purchasing the very best females to be found, it's still not inexpensive or a sure thing. In most cases you'll tie up \$1,500-\$2,000 per pregnancy, with no guarantee of mortality or quality of offspring. And not all cows respond well to super-ovulation. Some don't respond at all. Also, measuring reproductive and maternal performance is very complicated—if not virtually impossible.

If transplanting continues to grow at the current rate, there could be additional considerations. One is that extensive transplanting could lead to decreased demand for registered breeding stock out of anything but just the very best females. This could affect the value of the average registered Angus breeding animal. Transplanting coupled with open A.I. will tighten our genetic base. And with the use of non-progeny-tested bulls, it opens the door to more rapid infusion and propagation of genetic defects.

If transplanting is used wisely, it can be a great asset in the progress of the breed; but if used irresponsibly, it could be just as great a detriment.



AJ 108

**T.A. Bradley**  
Cave City, Ky.

The subject of embryo transplant keeps coming up in conversations about the Angus breed. My question is, if this continues, will the small and medium breeders

be able to hold a sale in the next few years unless the Angus association puts some teeth into it?

I think to be able to transplant, a firm should own the cow in her entirety and an interest in the bull used; then the egg should be carried by a purebred Angus cow in order to register the calf. If we do not do it this way, AHIR will mean nothing, because we are going back 25 years to the days when everyone showing had a herd of Holstein nurse cows on which they fitted the show herd. The small breeder who is unable to transplant and is raising his calves with the Angus cow would not have nearly the records that calves raised on dairy recipients have.

With the tax benefit of embryo transplant, people will be wanting to buy only the embryo transplant, so where will the market be for purebred cattle raised by the small breeder who does not have facilities or money to transplant? We are now creating a market for other breeds to be used as recipients instead of creating a market for Angus. If transplants were to be carried in a purebred cow in order to be registered, it would certainly create a good market for the Angus cow, whose individuality may not be the greatest but who gives plenty of milk.

If some action is not taken along these lines, the small breeder will have no market for his cattle, either bulls or females. Therefore, he will have no need to register his cattle or stay in the Angus business. If we lose a lot of Angus breeders this way, it will cost the Angus association thousands of dollars in registration and transfer fees.

Thus, I foresee it costing as much as \$50-\$100 in the future to register a calf in order to keep our association in the black!

In our operation, where we also farm approximately 800 acres of corn and soybeans and put up lots of hay, embryo transplant would not fit, as we do not have the time. The only reason I would buy an embryo transplant calf would be for the tax break received.



**Keith Cavett**  
Nome, N.D.

Interest and activity in embryo transplants is running high in the Angus breed. Certainly there has been sufficient success to demonstrate that the procedure is here to stay. But I believe there are some problems great enough to cause concern for most.

Cost of most ova transplants at a transplant laboratory presently runs in the \$1,900-\$2,000 range per pregnant recipient. Even with the most productive and

consistent donor cow, not every resulting calf will be a great one. So figure on averaging cost of the culls with cost of the really good calves.

Acquiring really good recipient cows is a problem for a transplant lab or for the breeder who is or will be doing the program on his ranch or farm. A recipient that has a bad udder, mastitis, poor mothering ability or an insufficient pelvic area will make a breeder realize all his recipients had better be good ones.

As transplant numbers increase, the marketing aspect must be analyzed. Will breeders be hesitant to purchase a herd sire prospect that has several full siblings the same age? Or would they be inclined to seek out an animal that is the result of a single pregnancy so others cannot have the same pedigree for at least that year?

I believe the donor cows that prove themselves unquestionably superior will be merchandisable for some time, but others will prove unprofitable rather quickly. The breeder who sells only the real worthy transplant calves and doesn't deluge the market with numbers only should be able to maintain a good market.

Evaluation of calves on recipient cows may be different than if raised on their natural dam. Extra large heavy-milking recipients should give transplant calves an extra advantage in some cases, but certainly that advantage shouldn't extend much beyond weaning. However, even before ova transplant, many top calves have gotten a little TLC, so we breeders should be able to realistically compensate for this advantage. Performance ratios and in-herd comparisons may have to use a combination of the natural dam's current and/or past performance and an adjustment for recipient cow advantage for 205-day weights. It won't be perfect, but remember, if a cow is injured or sick during a year's production, we don't make any adjustment either, so even now there are chances for inequities.

Even with the problems involved, we feel that a transplant program can yield tremendous benefits. We've done some transplants and plan to do more as we see the results and how they fit our particular management. It will not be a quick 1-step solution to breeding all perfect cattle, but it should help us achieve definite progress using genetically superior cattle.



**Tom Drake**  
Drake Farms  
Davis, Okla.

When thinking about entering into an embryo transplant program, remember two things. One, all cows are not transplant

material and, second, not all cows will transplant successfully. I have seen, too many times, a cow in embryo transplant that shouldn't have been. The breeder or owner didn't have any idea about her breeding value ratios, as he was not even enrolled on AHIR.

In our case, we started with four of our best cows. One transplanted very successfully, two about average and the other just barely. We were fortunate that the best cow was the most successful.

The cost of an embryo transfer is staggering, and too many times the wrong cow is there for the wrong reasons. Proven producing cows from proven parentage are the only ones that should be used. However, as we have more information available through AHIR on a given individual, there is always the possibility that the next generation should be used, i.e., an open heifer.

In our breed's search for tall, let's not forget what made us the No. 1 breed—maternal traits! Calving ease, milking ability and the ability to breed back on time. The breeding values available through AHIR should be the first step in deciding which female to enter in embryo transplant.

With the arrival of sexed and frozen embryos, the future of embryo transplant is very bright. If the cost of these two new steps can be brought down somewhat, imagine how many incubators a breeder would have roaming his pastures.



**Jim Danekas**  
James Danekas  
& Associates, Inc.  
Citrus Heights, Calif.

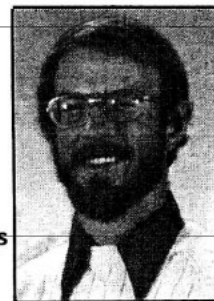
Embryo transplanting can be costly experience with mixed results. In my opinion, only an elite percentage of the females of the breed warrant this time and expense. This elite group should be identified by the time they are five years of age. Taking a young heifer that has no production record and entering her into a transplant program certainly can be costly in terms of time and money. You are dealing with an unknown quantity. Both the sire and dam may be on the WHO'S WHO list, but this does not guarantee super results from the progeny.

Breeders throughout the industry are having varied success with transplant procedures. I believe that management is again the prime ingredient for success or failure. Each and every month a female goes without producing costs dollars. Under today's economic pressures, you cannot afford to just go through the motions without results. Results are necessary for the well being of both you and the female being transplanted.

It is interesting that since embryo transplant procedures have been perfected, each and every breeder in the land has a female he feels is the quality and kind to be considered as a transplant candidate. Each and every sale now features a transplant candidate. They aren't so rare an item as they were thought to be. However, at times, promotion alone makes certain females fall in that elite transplant category.

Through embryo transplant, the superior genetics possessed by these great females are allowed to be spread and utilized by a vast Angus audience. Its wealth is immeasurable. You ask . . . should one buy an embryo transplant calf? The answer should be . . . if you feel this particular individual is the one that has what your program is lacking and needs. Don't let the fact that it is a transplant calf sway your decision. If the genetics and performance you are looking for are there, latch onto that individual immediately.

Embryo transplant is another tool to move and influence your program. However, it is only a tool which, like all tools, must be taken seriously and used carefully.



**Kevin O'Bryan**  
Timber Valley Farms  
Dawn, Mo.

When I first became aware of embryo transfer, I was skeptical. I felt the extremely high cost and possible danger to the donor cow far outweighed the advantages. Successes in the past few years have made me realize, however, that embryo transfer can be a very valuable tool for breed improvement. With this process, breeders can utilize the outstanding females in a breed to a much greater degree than before. Not everyone, however, agrees on which are the top females within a breed. I think that before a cow enters an embryo transfer program, she must be evaluated by her past progeny as being in the top 1% of the breed. This should be done by using performance and saleability.

At present I think too many females being transplanted are either the biggest prettiest cow in the herd or an outstanding yearling heifer that has never had a calf. Although a breeder may hit the jackpot at anytime, he can vastly improve his chances of success by using a proven producer as a donor.

The widespread use of embryo transfer has greatly increased the value of outstanding females. It seems everyday a new record price is established for a yearling heifer or a mature cow. This is extremely nice for the

seller and can be profitable for the buyer if (1) the female responds to ova transfer, (2) the combination he uses works and (3) he is able to merchandise the offspring.

The average breeder who doesn't have access to the large amounts of cash necessary to transplant a cow can take advantage of ova transfer if he can attract an outside investor. This allows the owner to transplant the cow and gives his investor/partner a chance to own progeny of a cow he possibly can't buy.

We at Timber Valley are going to transfer what we feel is our top cow. She is eight years old, has had an outstanding calf each year and is an excellent individual. We just hope we stack the deck right so we can speed up the progress of our herd or get some additional income from our cattle operation.



**Jim Lux**  
275 Angus  
West Point, Neb.

Embryo transplant! An exciting new management procedure. Like most new procedures, it will be a monetary bonanza in some cases and an economic pitfall for others. The real potential of embryo transplant is between these two extremes.

Perhaps the greatest benefit will be the tremendous savings in time. Suppose one has a truly superior cow but is not certain which sire to use. In a few months the cow can be mated to several different bulls. Without embryo transplant, it would take years to do this. If a breeder feels certain which bull his superior cow should be mated to, embryo transplant practically assures him of getting a calf of the desired sex. Again, this could take years of production by the normal method. Embryo transplant greatly increases the chance of the right genes combining to make that one super individual that will benefit the breeder and the whole breed.

The question is asked, how does embryo transplant fit in a performance program? I think one has to assume that anyone spending the considerable amount of money to get an embryo transplant calf will provide adequate nutrition for the calf. The calf should also inherit ability to grow; otherwise there was no point in producing it. I don't think anyone should consider using in a purebred herd an embryo transplant bull that has a 205-day weight of less than 650 lb. or a 365-day weight of less than 1,100 lb. We probably can be more lenient with heifers, but I think an absolute minimum would be a 500-lb. 205-day weight and 700-lb. 365-day weight. Ratios are somewhat harder to compare, as the

calf is not nursing its own dam; but in any given herd, we would expect the transplant calf to ratio well above 100.

A final question is, would we buy an embryo transplant calf? The answer is yes. We recently purchased an interest in a very popular embryo transplant bull and feel he is a positive result of the program.



**Steve Simmons**  
Omega Farms  
Williamston, Mich.

Embryo transplants undeniably have an important role in the advancement of registered livestock. The obvious advantages are (1) being able to more quickly identify genetic plusses and minuses, (2) being able to use genetically superior females for greater productivity, (3) being able to increase genetic base and possible profit potential.

However, embryo transplants should not be considered to take the place of performance management. Performance management should maximize the productivity of your herd. If you have succeeded in achieving very high breeding and calving percentages. Good weaning weights and rate-of-gain efficiency, then—and only then—are you ready for embryo transfers.

Embryo transplants are not necessarily a ticket to better calves. I think this process only makes sense for outstanding cow herds with intense management and abundant labor. Embryo transplants cannot take the place of top management in production and performance—it is the last step on the management ladder.

Because recipient mothers are used, the performance records are clouded for the transplant calf. I feel weaning weights are a measure of the dam's performance. Surrogate mothers are often dairy cows who naturally should give much more milk, resulting in higher weaning weights.

I would only consider purchasing transfer calves from proven genetically superior dams. That dam has to have the type to be the best in my herd. The producing capabilities of the dam are extremely important.

I have used embryo transplants on a limited basis at Omega. In my test case, the results have not outweighed the added expense. The added cost of taking care of dairy cattle versus the high-roughage ration (hay and stalks) fed our wintering Angus cows has made this program unattractive. Other added problems, such as super-ovulating the donors, also have limited embryo transplants' appeal to me.

**J. Scott Morrison**  
1726 Farm  
Lebanon, N.J.



We have given embryo transplant a lot of thought and investigation. It seems to offer promise; however, in my opinion, the gap to date between promise and results has not been bridged.

First, the cost for current state of the art, although fully deductible in the year, is currently quoted in a range per live calf (all the calves, including the culls) that would not appear to be recoverable within the life cycle of the progeny unless the general market rises to above parity levels. When researchers can achieve an assured female ratio of 80% or higher, then the herd turnaround may justify the costs.

Second, we have concern regarding the over-all maternal characteristics of females being used. Recent examples of old senile cows near the end of the trail with lower and weaker reproduction capabilities as well as unproven 2- and 3-year-olds with unproven or potentially inferior maternal traits give rise to serious questions.

Third, and to us most important (because the first two problems eventually will be overcome), is the question of true performance. The nurse cow is an unwritten taboo in a purebred operation. A Holstein recipient is bred for milk production, so performance such as weaning weight, WDA, nursing index, and over-all maternal phenotypic characteristics are going to be completely distorted. Herds using AHIR and other individual performance systems have made tremendous improvements with true measurement of heritable genetic economic traits. It will take at least two or three generations of further non-embryo breeding to determine if true progress has been made.

In summary, the goal is to produce superior cattle from super-cow embryos. How many that already have been produced resulted in superior individuals in the natural environment and in particular have been more successful in breeding programs than using top semen on top cows and at what cost?

**Al Lundstrom**  
Janesville, Wis.

The use of embryo transplants has established itself as the breeding mechanism of the future. Although we have not used it, the potential is unlimited. It certainly will eliminate the need to experiment with many of the marginal bulls and cows in our industry.

Performance programs with new criterion definitely will have to be developed. It seems that, unless all the reci-

cient cows in the industry are uniform or of the same breed, information developed from the current performance programs would be misleading. Those who use dairy cattle for recipients are going to have the advantage of a better-milking female over those who use a beef cow. If many different types of cows are used in the same herd, how could the offspring of a specific mating be compared for performance with its peers?

Buying an embryo transplant calf poses many of the same questions. If performance data is going to be the determining factor used in promoting the offspring to your customers, what are the standards?

Certainly one's market will dictate the kind of product and product information a breeder is able to merchandise. Registered as well as commercial breeders are currently more conscious of productivity. Our economy will not allow the amount of time we used to take in developing a quality calf crop. Everyone must be more aware of their market and the needs of their customers or accept the challenge of educating them to the type of product Angus breeders are developing. The only permanent thing is change, but with change must come education.

### **Bill Wilson**

**Premier Angus, Inc., Cloverdale, Ind.**

At Premier Angus, we are actively engaged in an embryo transfer program, as

it is another tool to be used in herd improvement. Just as A.I. allows us to extend the use of an outstanding sire, embryo transfer allows us the same potential with an outstanding female.

I do not feel that embryo transfer is suitable for everyone, but it can be used to a great advantage in your breeding program if used with forethought and planning. The most important thing is to make sure that the people who perform the embryo transfer are qualified, knowledgeable and have proven experience in this field. Second, I think every breeder needs to realize that not every cow will respond satisfactorily to embryo transfer. Due to the cost, past production and pedigree saleability of the donor cow should be carefully analyzed and considered before one enrolls a cow in embryo transfer.

Through embryo transfer, we lose some measure of the milking ability of the donor. Performance data on the calves born as a result of embryo transfer cannot be compared or ratioed with calves born naturally. However, I feel that a cow who goes into embryo transfer should have already demonstrated her ability to raise high-performance calves; therefore, we should not hurt the performance of the herd or the breed in general.

I feel that embryo transfer has a bright future in the next few years when it becomes practical to freeze embryos. Freezing should cheapen the cost of em-

bryo transfer and make it much more practical to the industry. By freezing the embryos, you can better plan calving times, and frozen embryos would be much more practical than live animals to ship to foreign countries.

In summary, I feel that embryo transfer has a definite place in the industry if used with forethought and planning.



**Dave McMahon**  
**Belle Point Ranch**  
**Lavaca, Ark.**

It finally dawned on us that our operation cannot compete—at all—with young cattle that are actually on "nurse cows" prior to their birth. As a result, we have been purchasing embryos out of young (two years old and less) good-milking (or at least with a good chance to be), easy-calving (we hope), nationally acclaimed females in our breed. And we want the embryos in Holstein cows.

The Holstein nurse cow produces too much milk, and this creates all kinds of problems after birth. Yet it is an accepted fact (by many) that host cow size does have an effect on the size of her calf. Really, an

alteration of the environmental portion of "The Triangle of Life" (see our advertisement, *ANGUS JOURNAL*, Page 33, March 1981). Many people starve heavy-milking host cows before and after calving to diminish milk production and avoid some problems.

Weaning weights mean nothing with embryo transfer calves. Is or will embryo transfer wreck sale of what should be higher priced young females as A.I. has done to bulls? Embryo transfer works and will be around for a long, long time—much as America's space program will be.

Well, it is fine to "pick," I know. One should offer a solution or alternative. I have one. The American Angus Assn. could (or should) establish a rule that one could only register calves produced by embryo transfer if the host cow was a purebred registered Angus female! Just think what would happen if the embryo transfer people were scouring the Angus countryside for easy-calving, good-milking, acceptable Angus females instead of financially helping dairy breeds. There is no need to louse up a great breed of cattle and destroy a great set of records! We must give this thing some thought. Like my good friend Roy Withers says, "If it ain't broke. . . don't try and fix it!"



**Merlin L.  
Haggard**  
Losantville, Ind.

Who can afford to?

We have done a lot of serious thinking concerning embryo transfer in our program. We have tried very hard to justify the price, as we really feel that we have several cows strong enough to be considered candidates. One of the problems all smaller less-publicized herds have is merchandising animals at a profit in this price bracket. I just don't feel at the present time our market will accommodate this price factor on a very large scale.

What will it do to the breed?

I think the short-term effects will be good for the breed, but I feel the long-term effect could hurt. In the short run, we can greatly increase the productivity of the great cows. Ideally, it is good to think of a herd of cows made up of daughters of our very top cows. I cannot help but think, though, that in so doing we will greatly reduce the genetic base in the individual herd and also the genetic base of the Angus breed. By greatly concentrating the top bulls and top cows, we could destroy one of our greatest assets—the very broad genetic base we now have.

What is to come?

I think before too long we will be able to buy an embryo the same as we are now buying semen. When embryo freezing is perfected, it will open up a whole new field. The top cows of the breed will be in very great demand for a while as the bull studs collect them, and they surely will demand a great price. There is no doubt this will give breeders a short-term boost, but again we must ponder the long-term effects on the average breeder. Will the small herds buy their potential herd sires in embryo? Why keep the good cows on hand when we can buy the very best embryo and put it in any cow? Will the genetic base again be concentrated in fewer hands? How will this ef-

fect me and my ability to produce and merchandise my herd on a profitable basis?

These are all hard questions and ones for which there are no concrete answers, but I feel they are questions we must all ponder as we look at the future of embryo transfer.

**Sam Wagner**  
Caldwell-Wagner Angus Farm  
Harlan, Kan.

Embryo transplant is a very exciting concept and offers additional tools for purebred breeders. However, at present it is a program that lends itself to fast easy promoting and unrealistic expectations.

I feel there are going to be some very

disappointed people who have entered into embryo transplant simply to get on the bandwagon. A transplant calf will be no better than the same natural mating of that particular cow and bull. There will be the same percentage of poor, mediocre and good calves. The only thing embryo transplant can do is to increase the number of each type.

This brings us to the donor cow, which to me is the primary consideration. A bull is important, but you can purchase semen from most of the top sires. What is necessary is that great cow, one who has proven through her production that she can transmit the breed improvement qualities you deem important. Probably less than 1% of purebred females are candidates of this quality. Only through use of the great females can embryo transplant cost and expectations be attained.

One very important advantage of embryo transplant is the possibility of testing for genetic defects. Bulls can be tested faster and, to my knowledge, it is the only avenue open for testing females.

Our particular goal in the use of embryo transplant is simply to get additional daughters of one or two top cows. If we can double or triple the number of daughters retained as replacements, I feel we can justify the cost and effort. We also will be testing for genetic defects.

In closing, embryo transplant is simply another tool to be used to help speed the slow pace of breed improvement. Like most new programs, usefulness is over-exploited, and early expectations exceed results. However, it is important and eventually will find its place in sound breeding programs.

**Bob Burton**  
Burton's Highland  
Meadows Ranch  
John Day, Ore.



We feel that super-ovulation and embryo transplant are two of the best tools made available to our registered operation in many years, allowing us to get larger numbers of outstanding cattle in a much shorter time.

AHIR and other types of on-the-ranch performance tests have helped us identify our genetically outstanding cattle, which we used in our transfer program both on the ranch and through two of the well-known transfer facilities.

When anyone starts thinking about this type of program, there are several things to keep in mind, because at best it is very expensive and has no guarantee. We had to be careful not to use cows or bulls just because they were our favorites but to use them because they were superior. Since we



still had no guarantee that we would have a superior offspring, we could have ended up with some very expensive steer calves.

Not all cows responded to super-ovulation in the same way; some released several eggs, while some did not release any. By not knowing how many recipients we needed, we had to have more ready than we might need at any one time. Because of the high cost of the program, the recipient cows had to be kept in excellent condition, they had to be good-milking cows and had to be well cared for after the transfer.

While heat synchronization has helped in our on-the-ranch transfer program, I believe the future of on-the-ranch transfer lies with frozen embryos collected and stored in liquid nitrogen, then thawed and transferred when the recipient cycles normally. We have one cow being collected in this manner and are looking forward to trying this. Our success with on-the-ranch transfer is still open to question, as the calves are just now being born.

We apparently averaged about three pregnancies per donor cow that responded. After making the actual transfers, we turned out a bull of a different breed with a chin ball marker; and as he bred and marked any cows, we turned them out in the commercial herd, assuming they would have a commercial calf. We missed on two cows last year.

In closing, I feel this is an excellent tool but just another tool to move us forward.

### **Craig Stephenson**

#### **Allegro Angus, Camden, Ohio**

In every business venture there is risk. Naturally, some businesses are more risky than others. Whatever the amount of risk involved, the name of the game is to lower that risk. Used properly, embryo transplant can lower your risk and put more of the odds in your favor. Transplanting is not the sole answer—nor is transplanting your best

cow. Assuming you can handle the initial cost of transplanting, the answer lies in evaluating your cows individually, your management, your merchandising skills and marketing potential.

To lower risk in breeding cattle, one breeds a good cow to a good bull to get a better calf. Naturally, it's not that simple, but that is basically how it works. Good plus good doesn't always equal better, though. The more positive results one gets, the greater the profit. Evaluating your cows or your potential purchases by their past performance and choosing for transplanting those that always produce better will greatly increase the odds in your favor.

Bringing your herd management to a top level and coordinating your program with the transplanting team can go a long way in reducing risk. Having the capability to do transplanting work on your farm or ranch can mean considerable savings. The better the facilities, the less stress on your cows, which means the potential for more calves.

Sire selection is a very important item. Strengthen any weakness a cow might have, physically or pedigree-wise. Herd health and nutrition aren't to be forgotten once you're 90 days safe.

Congratulations! You've got eight calves out of your best cow. And most likely you have a \$16,000 note coming due at your friendly bank. To top it off, eight bull calves. This particular situation is one that would cut into your profit potential if you hadn't evaluated your marketing potential. Here lies the greatest question in embryo transplanting: Is there a market for my product? If there is a market, are all of the calves going to be marketable? If not, are enough of them good enough to sell to cover expenses involved?

If the plan includes keeping all the heifers, fine; but somewhere down the road they are going to have to pay their way. Having an equitable market for transplant calves is the single most important variable

to analyze before transplanting. Improving your merchandising skills can help open that market.

These are a layman's thoughts on embryo transplanting. I have not transplanted, nor have I seen a "litter" of calves. Transplanting must pay its own way on my farm. By looking for the right cow (within my means), increasing my management skills and developing a market for my product, I can reduce my risk in breeding cattle and possibly in the near future introduce embryo transplanting in my program.



**E.G. Foote**  
Melba, Idaho

Embryo transfer is rapidly becoming one of the new means of producing top-quality registered Angus cattle. By selecting one or more of the superior cows within one's herd, one can develop a large group of females carrying the genetic strengths from these few cows in a short time. At present, it is a fairly costly and time-consuming venture. Therefore, it must be emphasized that only the very top cows of the Angus breed be considered for such a procedure. With use of the non-surgical technique for doing transplants, it is generally a no-risk procedure for the cow.

We at Foote Acres Angus are currently in the process of evaluating the "cream of the crop" in our own herd to determine which cows should be placed in embryo transplant. We are using visual appraisal, performance data and maternal characteristics as bases for our decisions. Up to now, we have

transplanted one cow, using the on-farm technique with some success. We not only have the pregnancies from the transplanting process but also have a natural pregnancy—and all within a 6-month period. Sale of the previous calves from this particular female would more than off-set the cost of doing the transplants on a per calf basis.

I feel that embryo transplant programs have a very useful place in the breeding of Angus cattle. When one can justify cost of the transplanting procedure to the benefits of gaining increased numbers of offspring with the genetic superiority of their dam, it then becomes economically feasible. I'm quite confident that the breed as a whole will take tremendous steps forward as the embryo transplant procedure gains more acceptance in years to come.



**Dr. Art Ludwig**  
Matterhorn Farms  
Alabaster, Ala.

The successful purebred breeder is a genetic engineer engaged in a large Mendelian experiment. Until now, enhancement of desired animal traits and characteristics has been a slow and tedious process using artificial insemination. Now embryo transfer combined with the frozen embryo technique and cloning is about to make an impact on cattle breeding that will dwarf the accomplishments of artificial insemination.

The truly super cow may produce 30-50 calves per year by simple embryo transfer and conceivably 120-200 calves per year utilizing the cloning process. When the technique of freezing embryos has been improved to allow for 70-80% successful implantation, the current prohibitive cost should drop to less than \$500 per embryo.

Cloning, the process whereby a breeder can both select the sex and obtain up to four genetically identical animals from a single embryo, will drastically multiply both the numbers of desired progeny and the profitability of the process. Commercial cloning of embryos will be here in a matter of months. At least two organizations are well advanced in their efforts to clone.

With the advent of computers and clones on the farm, it is an exciting and dynamic time to be in the purebred cattle business.

**Allan V. Miller**  
Cheyenne Angus Farms  
Great Bend, Kan.

Although the jury is still out on embryo transfer, we at Cheyenne Angus Farms are using a herd bull that is the result of this

procedure naturally, by A.I. and to transplant four of our superior cows in a local transfer facility.

I see embryo transfer as a tool to increase the genetic odds of a great female to produce that super calf—or to increase the genetic influence of certain females in your cow herd. Few national champion females have ever produced that one super individual among their natural progeny. On the other hand, superior bulls have had a greater chance of doing so through A.I. Embryo transfer gives these super cows the quantity of progeny for the genetic odds to work.

In spite of these possibilities, I see two serious disadvantages to the widespread use of embryo transplants. The first, an obvious problem, is the promotion and merchandising of cattle on the sole fact that they are transplants. You have a lot of money invested in a calf before he is born, then may have to recover that investment on a mediocre calf by marketing him as a product of embryo transfer. We went through this same problem in the early stages of A.I.

Second—and in my opinion most serious—is transplanting heifers. You take a show-winning heifer with super conformation and eye appeal, and by the time she would calve naturally, you have a whole lifetime of production ready to hit the ground. The hang-up comes with the unknowns—this female's ability to calve unassisted at an early age or even her ability to carry a pregnancy to term! You are propagating an individual with unknown performance, milking ability and the mothering ability for which our breed is now known.

The future? We already see embryo transfer becoming a practical tool for the progressive breeder. On-farm transfer, practical estrus synchronization and non-surgical procedures have made this possible. I envision breeders doing their own transfers with the use of frozen embryos. Procedures will be simplified and techniques standardized to make this as common as A.I.

With embryo transfer already showing its effect on the value of the best females of the breed, it becomes a necessary tool to use to make these females economically practical.



**Chris Miller**  
Ascent Angus Farms  
Oakland, Ill.

During the past few years, the business of breeding outstanding Angus cattle has caught fire. Genetic progress has been

unbelievable! The limit on the value of an outstanding female has not yet been established.

The main reason for the high prices is the widespread use of embryo transfer. It used to be said that if you don't have an aggressive A.I. program, you're going to be out of business. I believe we are fast approaching the point that, if you don't have an aggressive embryo transfer program, you're going to be out of business because you won't be able to compete.

We are transplanting because we feel it is a necessity, not because we want to. Outstanding females cost too much money for the common Angus breeder. That may sound like a stupid statement, but let me explain. Time after time, I have sat on the bleachers at an auction and been unable to buy the females I needed because someone with investors or a large company was behind the bidding. There is nothing wrong with investors or companies, but they have forced us to take our best females and transplant them. We are using transfer strictly as a herd-building tool.

I don't think transfer is for everyone. I think you need to carefully analyze your wants and needs before entering into it. Following is a list of things I believe you need to consider before entering into a transplant program. I'm not going to try to answer the questions. I think that's up to you.

Why do I want to transplant? Replacement females? To stay ahead of competition? Potential big dollars? Show ring winnings? What about the economics of having \$800-\$2,000 tied up in a newborn calf? Do I have a good enough cow to transplant? Can I afford to buy a cow good enough to transplant? Do dollars make a transplant cow? What is a good transplant candidate? Where will I be if I don't transplant—if I do?

There are pros and cons that have to be weighed in anything you do. One needs to do what best fits his situation. If transplant could be an asset to your business, I highly recommend it. We're in a fast-moving world, and it's easy to fall behind. In order to get in the lead and stay there, you need to continually come up with new ideas and strive to set trends and not follow them. Followers are always at least one step behind.



**Jeff Liston**  
Liston's J Bar L  
Angus  
Lovilia, Iowa

Embryo transplant is novel, exciting, useful and expensive. As with any new tool in the cattle business, there is definite

genetic improvement to be made with its use—and plenty of room for over-use.

With any genetic venture, there is no such thing as 100% success. There will be progeny of great value—and those of only pound value. This risk factor is greatly multiplied with transplanting in that you are wrapping up \$2,000 in an unborn calf. How many calves can you sell at this figure? If you cannot go into a transplant program and be happy with a few good solid herd replacements, I would strongly suggest not making the attempt.

Our transplant work allowed us to sell a top young cow in her prime but still retain a lifetime of progeny. Donor cow size is not a good single criteria for transplant selection.

Cow and feed efficiency will be as important in years ahead as pedigree and weight records are today. Fertility, productivity and dependability are prerequisites in a donor cow. She needs either progeny records or several generations of superior-performing ancestors to be a good risk. Our first donor was a heifer (she will never be a 1,500-lb. cow) in healthy condition; however, we had four generations of performance background on her and she was a second-generation major show winner.

As for sire selection, you have to examine what your distribution goals are—whether calves are to be sold or kept. In general, I think an outside bull makes the best sense. This gives you a chance to raise

an outcross bull you can use yourself. You need to go popular for marketability and performance for dependability. The bull which best combines these two is the one to use.

We cannot support the opinion that the recipient cow has no effect on the resulting calf. Because of this, actual performance figures of the calves are highly distorted. Your top commercial cow will raise a calf worth many times more than the poor commercial cow; even compensatory gain cannot make up the difference in superior weight and structure of the calf out of the better cow. For this reason, beware the cheap recipient cow; as in any area, quality has no substitute.

In summary, plan for the worst. If you cannot live with average calves out of ova transplant, don't try it. Remember an average transplant calf usually will be worth no more than an average "normal" calf no matter how much you cry to the buyer.

I should mention that my opinions are based on limited experience. We have neither the money nor desire to transplant on a large scale. Our three flushes have resulted in six live calves and eight safe pregnancies. We have gotten the best yearling heifer we ever raised and a bull we will use, but then the sire of these calves has since ranked No. 1 in AHIR field evaluation for weaning and yearling. As our herd improves and generally gets younger, the idea of using ova transplant will get increasingly hard to rationalize, but its use on those proven tremendous cows always will have its place.

**John Henry**  
Henry's Stock  
Farms  
Whittemore, Iowa



Embryo transplants became a part of our program in April 1981. We are doing it to make better use of our best cows, and only five or six cows will be transferred this year. We feel that we can make it work by using our own recipient cows and by working with the local veterinarians, one of whom has been doing embryo transfers in swine for the past 2½ years. We did all the preparation on the farm and only used the vet clinic the day of the transfer. We used older and poorer producers for our recipients. By using our own Angus cows for recipients, I feel we will have more accurate performance information on these calves.

Embryo transplant can benefit our program and the Angus breed in many ways. However, I feel that we should not be using dairy or dairy-cross cows for recipients. First, if we use dairy cows, we cannot come up with a true 205-day weight. Second, I

want the genetic make-up—not the abundance of milk from a Holstein cow—to improve 205-day performance. Finally, I feel that as Angus breeders we should not promote a breed of cattle other than our own.

If I were buying a transplant calf for a herd bull, I would want to know what he had nursed. A larger calf with a good 205-day weight will not mean as much if the mother was a dairy cow. On the other hand, another young bull on an Angus mother may not be so big at 205 days but may have much more genetically. When buying calves it is hard to turn down size, but if you purchased both calves and took them off their mothers, their yearling weights might show some surprising changes.

The use of embryo transplants will definitely speed up our performance program. Our goal is to produce as close to 10 calves per year as possible out of the donor cows. This procedure will give us the opportunity to produce the number of calves per year that the cow normally would produce in her lifetime. We also can compare full brothers and sisters much more accurately, as it is possible to have them close to the same age.

### **Terri Keffer**

**RCT Ranch, Mountain View, Mo.**

RCT Ranch has used the technology of on-farm embryo transfer for the past three years.

Transplanting improves your chance of raising the great animal; it does not guarantee it. Through natural reproduction, a cow does not have a great calf every time. This seems to be the major misconception of the entire program both in production and monetary terms. One of the drawbacks of embryo transfer is that the return on your investment is not guaranteed. We, as buyer or seller, must not consider the offspring as anything more than what we see before us and evaluate them as such. The price tag we place on these animals does not escalate simply because of the unordinary circumstances in which they were born.

I feel that most people involved with embryo transfer are doing so for increased production. Granted, we use what we feel to be our highest quality cows for donors, considering all factors—performance, fertility, frame and pedigree. But trying to assure the end product will excel in all factors is futile.

Having barely scratched the subject of embryo transfer, I feel I need to stress that a lot of hard work is involved before the cattleman has the opportunity to either buy or sell an offspring of embryo transfer. However, it is my opinion that on the whole the advantages outweigh the disadvantages in ways that can benefit every cattleman.

**Dave Canning**  
**Canning Land &**  
**Cattle Co.**  
**Rougemont, N.C.**



The old Scotsman who founded our breed placed great stress on families; they were distinctively named and recognized for years and years. Back some years ago when I was managing a lot of sales, the late J.B. McCorkle and I used to promote the family end of our business—maybe too much. Now I think just the opposite of cow families.

Unquestionably, embryo transplant is a way to multiply the value and contribution to the breed of superior females. I am doing one right now, a granddaughter of the great Camilla Anne cow, mother of Colossal.

However, I see several pitfalls ahead of us. Most of us are using Holstein cows as recipients, and no doubt there will be some excessive growth in some of those calves that will make them appear larger and growthier than their genetic background would call for. This was a scourge of our breed years ago when we all had to use nurse cows to get cattle fitted to suit the judges. I have nothing against calves getting plenty of milk when they are young, but all of us know that too much milk is almost as bad as not enough, particularly

when you are trying to run cattle under efficient range conditions. We also have found that these excessive milkers require a great deal more feed or they will not cycle and rebreed as they should.

Another great advantage of embryo transplant that I see is the possibility of being able to ship to other countries that do not accept live cattle from us or where the freight costs for live animals make it prohibitive. I am hoping in my own instance to get some that I can take into New Zealand some day for my herd there.

I would caution anyone going into it to be sure they are transplanting an absolute superior cow. It cannot be just some big fat cow that has been something of a slow

breeder so looks better than she is; be sure she is truly a great one. Then I think the cost is worthwhile and the results could be significant, particularly if great care is taken in the pedigree research so we know there are no damaging genetic possibilities in the background and that the bulls used to fertilize these embryos have been genetically tested free and clear of genetic defects.



**Dr. W.P. Watts**  
Wattslun Farms  
Bowling Green, Ky.

The embryo transplant procedures being used in the beef industry can be either a source of genetic strength or a case of spinning our wheels at a faster pace. Before a cow should even be considered for a transplant program, she should already have produced not just a good calf but an outstanding one!

When I say an outstanding calf, my main emphasis is on size. That is the main reason for the existence of a transplant program. Length, height, milking ability and structural correctness are also necessary ingredients for a superior donor cow. In addition, she must carry an impeccable pedigree capable of transmitting these qualities to her offspring. I believe there are only a few animals in existence today that can meet such a standard.

However, future generations of cattle should offer greater availability of outstanding females due to the embryo transplant programs now in existence. I would caution breeders to examine donor cow prospects in a cost-efficient manner, using only animals which can truly advance their programs.

All of these criteria were considered before I purchased my transplant calf. The results so far have met my expectations.



**Tim Dievert**  
Blugrass Angus Farm  
Danville, Ky.

I believe that embryo transfer easily could lead to greater breed improvement than any other available management tool with the lone exception of artificial insemination. The transplant program has greatly enhanced the value of the really extreme top percentage of registered females as evidenced by the many record-breaking

prices cows and heifers have commanded during the past couple of years. The thought of some day having your entire calf crop out of only top cows is very intriguing.

I further believe that as technology involved with the freezing of embryos becomes more perfected, the use of embryo transfer will become much more practical. Currently, the biggest disadvantage of the program is the high cost of acquiring and maintaining an adequate number of recipient cows. The freezing of embryos surely will bring about more efficient use of recipients. I also see as disadvantages the questionable quality and/or productivity of some cows placed in transplant and the reduced significance of performance records of the transplant calves.

At this time, we at Blugrass Angus Farm have not placed any cows in a transplant program; however, we are exploring the services of various transplant specialists and in all probability will begin a transplant program in the near future.



**Max Fawley**  
Rosette Angus, Inc.  
Warsaw, Ind.

As is the case in every industry, great strides are being made in the modernization of raising livestock. Embryo transplanting is and will be a valuable tool in speeding up the process of producing superior beef cattle. Surely it will be comparable to artificial insemination in its impact on beef raising if used to its full potential.

An outstanding cow can now have a tremendous influence on the industry by producing as many calves each year as previously would have been possible in her normal lifetime. Today more cows can be culled off the bottom end of a herd and calves can be raised from the top end. Though the financing of transplanting may seem prohibitive, it probably will decrease as more breeders use the procedure and it is more highly perfected. Even now, what breeder would not pay \$1,000-\$1,500 for calves from his best cow?

Embryo transplanting will create challenging decisions and new problems for today's cattleman. These problems are, however, not yet well defined. To be sure, performance programs will run into new adjustment problems. Over-conditioned and staggy donor cows are a concern to some breeders. Super-ovulation, though giving the advantage of multiple calving, is a risk if the mating combination doesn't prove satisfactory.

The future looks bright for embryo

transplanting. Freezing and sexing of embryos are processes soon to add to the value and adventure of transplanting. New sales potentials loom ahead as breeders market bred recipients. The Angus breed will benefit greatly from transplanting. It is the No. 1 beef breed today, and there is no reason why it cannot continue in that position.

**Dr. Charles F. Campbell**  
Campbell Angus Ranch  
Diana, Texas



I have some reservations about what this new system is supposed to produce. It seems that eyes are focused upon height alone. Everyone wants 53-54-inch height in the donor cow. According to my customers, Angus breeders have done an excellent job in the last 10-12 years of improving the over-all herd. Mostly, we have been focusing on beef production through performance testing. Should not the embryo transplant offspring be subjected to the same standards?

The Angus breed enjoys a great number of distinct advantages such as easy calving, small birth weight, good milking ability, good mothering characteristics and quality second to none. Are we ready to give this up and allow the recipient cow to take their place? How are we to know if these embryo babies can produce offspring with calving ease, ample milk and good mothering ability? Thus we will know little about the cow except she was 53 inches tall.

My opinion is that we may lose what everyone knows Angus already have. The most reasonable method, if this is going to be the road we take, is to use donor cows that have proven themselves adequately before being used as donors.

Another aspect I don't like is the cost. If we are going to compete in the protein market, we must not lose sight of cost of production. Can these impressive embryo transplants produce protein on cheap pasture forage better than the animals we have been producing?

If height is all we are after, we can get a tall black animal by crossbreeding with one of the Italian draft animals, but most are not willing to sacrifice quality. If we are to survive in this competition of protein production—including the chicken, pork and soybean industry—then we should not give up all the advantages that have kept the Angus in good stead through the years. Such qualities have created such statements as "Why change the beef grading system? Why not just change to Angus?" Let's not lose the advantages of Angus that elicit such statements.

**Dr. George Block**  
Sunny Valley Farm  
Yorkville, Ill.



The potential benefits of embryo transplantation are obvious and well recognized. The ability to obtain multiple offspring of one female from one or more sires within a year has and will have a tremendous beneficial effect.

Embryo transplantation has been an integral part of our breeding program for several years. The advent of commercially available embryo transplantation is the qualitative—but not the quantitative—equivalent of artificial insemination and the preservation of semen.

The advantages of semen storage and A.I. are accepted, but the inherent disadvantages are too often minimized. The same technology that enables us to utilize superior genetic material also has spread undesirable genes around the world. The process that has given rise to rapid improvement in frame score, weaning weight, yearling weight, etc., also has spread the genes of syndactylism (mule foot) and osteopetrosis (marble bone disease) throughout the industry. A similar danger is inherent and even more likely in embryo transplant if allowed without reasonable control. A breeder who has invested \$20 in semen is willing to cull an undesirable calf. The same breeder who has invested \$2,000 in a transplant calf is understandably reluctant to cull his \$2,000 mistake.

In order to reduce the possibility of promulgation of inferior genes via embryo transplantation, an enlightened set of standards should be adopted before a female is eligible for ova donation. Such criteria could include performance, proven lack of genetic defects, traditional blood type, the show record of the cow and her offspring, etc.

The adoption of such standards for embryo transplants may reduce the number of transplants but will assure that undesirable characteristics are not further intensified in our breed.

### **Steve Weaver**

Weaver Angus Farms, Peoria, Ill.

Embryo transfer has been used extensively enough to prove itself practical if used in the proper structure. As innovations presently being experimented with are refined and made more practical, embryo transfer not only will allow the progressive breeder the opportunity to make tremendous genetic progress, but it also will reduce the work load and expense of the breeder performing embryo transfer.

However, we also must realize that there is a negative aspect. There have been and will continue to be numerous people who have been unsuccessful in this endeavor. Embryo transfer is an expensive venture when used to any extent, and with the continuing high cost of money, there will be a good deal of money tied up and very little cash flow for a good deal of time.

We also must note the trend of seeing several cows termed worthy of transfer in most sales. However, unless you have a method or plan for merchandising the resulting offspring, the cow is not worthy of embryo transfer. We also see many cows being bred to bulls that do not produce consistently. All too often, we see one or two good calves in a litter and the remainder just average. Thus, the program is neither financially nor genetically successful.

Looking at the brighter side of embryo transfer, we see the amazing opportunity to increase the quality of a cow herd from a few superior cows at a geometric rate rather than arithmetically. Upon determining which cows truly are your proven producers—cows that have consistently produced the top calves in your herd—then a great deal of the risk of embryo transfer is eliminated.

As a specific example, in our own herd, we have identified a superior cow born in 1973. At this point we have more than 30 descendants on the farm and by the end of 1982 anticipate having 60-75 descendants. Again, we are breeding a superior cow line to bulls that have excelled in weaning and yearling weight as well as being highly ranked in maternal traits.

Perhaps the thing that will make embryo transfer most promising is the frozen embryo. It will offer a breeder the opportunity to collect embryos for an entire year but give him the management advantage of a shortened calving season. This will enable the breeder to keep a smaller number of eligible recipients on feed as well as to compare a larger number of contemporaries on the traits that are desirable to practical cattlemen.

Embryo transfer is a tool whose time has come when used like any other tool and properly applied.



**Noble Bell**  
Bell Farms  
Sarah, Miss.

It seems to me that breed improvement is one of the basic responsibilities of any breeder and that embryo transplant may become one of our most useful tools in conjunction with the more traditional techniques. We have several transfer candidates in our herd and hope to initiate a program later.

The advantage is real. The productivity of an individual cow is dramatically expanded. I think this is the only reason to seriously consider getting into a transplant program. Tax advantages are good and we all need them, but they should not be the primary consideration if the aim is to improve the breed.

The disadvantage, and it's a serious one, is the present cost of a program. No one I know is willing to predict that a series of natural calves from the same cow by the same bull all will be acceptable. The unpredictability must exist with transplant calves, since each will be genetically unique. If a breeder is ever to operate profitably, the net cost of his culls must be reflected in higher selling prices for his acceptable animals. But he must be able to provide quality breeding stock to other breeders and commercial cattlemen at prices reasonable enough for them to make a profit on.

I think that practitioners will continue to refine their techniques and that with increased productivity the cost of a transplant program will come within reach of a much larger number of breeders. Until that time, the greatest potential for breed improvement can't be realized, since only a small fraction of our vast genetic pool will be tapped.

I've heard it said that buying a transplant calf or recipient is buying a pig in a poke, and I think it is if the donor is an unproven cow (even if her pedigree is faultless). But it's entirely different once the donor has proven calving and milking ability. Even then I'd rather buy a transplant calf than a recipient for the obvious reason that the risk of getting an unacceptable calf or no calf at all is eliminated.

### Dr. John T. Purvis

Taylor Bend Farms, Concord, Tenn.

We at Taylor Bend Farms have decided to use embryo transfer as a tool in our breeding program. We have studied this at some length before embarking on this course.

We felt the first goal was to identify any cattle we possessed that were worthy to enter an embryo transfer program. We felt the costs were such that we needed to be sure of the quality of our donors.

Once establishing this point, we then decided whether or not to start an on-the-farm project or turn it over to one of the embryo transfer centers. We decided costs were such that we needed to make this an on-farm project. We feel if you can sharpen your skills in this area, it can become a routine farm program as has artificial insemination. We have a most competent veterinarian who has specialized in large animal reproduction, and this made an ideal situation for us. We constructed a small building in which to conduct our transfer in order to be under the most sterile conditions possible and set this up to

encompass our squeeze chute and cattle handling facilities.

I think embryo transfer has been one of the most important advances in cattle breeding. The possibility of drastically altering our breeding stock is vast. The next step in genetic engineering is to be able to consistently sex embryos and set up storage facilities for them and we will have gone one more step in being able to control our destinies in the cattle business.



**Walter Jungk**  
Treasure Cove  
Farms  
LaCygne, Kan.

We at Treasure Cove Farms are sold on embryo transplant. We think it is of utmost importance, especially to smaller herd owners, because it enables them to build a top herd of cows in record time.

You can take three or four top cows and transplant them and build a top herd in five or six years. Normally, this would take 15-20 years and be very expensive.

Of course it costs money to transplant, too, but when weighing five or six years against 15-20 years, the expense is minimal.

It is my personal opinion that, in a matter of perhaps 10 years, cattlemen who utilize embryo transplant will be head and shoulders above the average breeder and will be able to command a better market for their cattle.

As a boy I can remember my grandfather, a meat packer, saying, "You must always be willing to learn and use new methods to improve your business or you fall behind."



**Howard Held**  
Held's Angus, Inc.  
Hinton, Iowa

At the present time we have no problems with birth weights or calving. Therefore embryo transplant seems a little far-fetched for a plain old cowman to comprehend. In fact, we are old-fashioned enough to not be using A.I. I have a son who is certified in A.I. He has a jug with semen from all our herd bulls as an insurance policy against loss of use of any of them.

The cost in time and in host cows seems to be so high that I can't see too many

smaller breeders using embryo transplant. One thing that frightens me is the possibility of a serious defect that would not be visible. The same defect could affect as many as 20-25 animals. The result could be as wide-spread as the defects that have surfaced through A.I.

I don't have the time or the money to spend on such a project. I would rather let nature take its course. I have visited with many of my friends who are breeders and none seemed to be interested. It was even suggested this procedure is only a loophole for those looking for a way to avoid taxes.

As a breeder, I think we have many other problems that should be looked at ahead of embryo transplant. I might buy an embryo transplant calf if I found one that was really outstanding and the price was right, but I am not going to actively promote embryo transplant.



**Byron Beukema**  
Beukema's Angus  
Farm  
Newton, Iowa

Embryo transplant is one of the greatest assets to the beef industry and to any breed. With extensive selections and proper genetics, it can advance a herd and the breed in one year further than an average production program could in a decade.

I like to compare the embryo transplant program in the beef industry with dairymen's program of selecting a donor cow with the breed characteristics—size, frame and correctness—that will rank in the upper 1% of the entire breed and that has proven her capabilities by producing top-caliber calves from at least two or more desirable bulls. This would be the cow that would qualify as a donor.

I also like to think there are sufficient superior bull selections through the A.I. program. The great advantage of ova transplant is adding numbers of top females from the superior cow if a breeder will evaluate a cow herd as critically as he selects his herd bulls. There is another factor I feel is very important—using only cows of the same breed for recipients, for this will give a much better analysis.

In 1980 we selected cows for a super-star program—cows measured through AHIR—to be donors for the following three years, with a 5-year program in mind. Our purpose is to add 50 females from the five top cows in our 300-cow herd. These cattle also were selected and appraised visually for soundness, correctness, femininity, disposition, sound udder and teats (these features are extremely important).

I have traveled many thousands of miles in the last five years and have observed that there are still some Angus cattle lacking in frame, volume and breed characteristics. Because of this, we are using only cows that will scale from 1,350-1,600 lb.

The first donor cow we selected for the transplant program is the mother of the highest-ranking bull in the 1981 Sire Evaluation Report. She is a cow that is very feminine, structurally correct, has tremendous frame and scales from 1,450-1,600 lb. during the year depending on her nursing status and the season. The bulls we have selected were ranked in the top eight; in fact, one was the second highest ranking of the 564 bulls reported in the Angus Sire Evaluation Field Data Report, 1980. We will have 16 progeny from this cow this year from two flushes.

### Jay P. King

Kinglore Farms, Rock Falls, Ill.

At Kinglore Farms, embryo transplant has become an integral part of the purebred Angus operation. We have a laboratory and along with our veterinarian, Dr. Jim Collins, the procedure has been incorporated into our everyday functions.

We have based the future success of our herd on embryo transfer. We sold our mature cows in our 1980 production sale and are rebuilding with their daughters. We are especially concentrating embryo transplant on our 5-10 best-producing cow families.

In any operation, there's usually a handful of cows who year after year consistently produce the great calves. Consequently, this is where embryo transfer easily can be blended into our existing program.

However, this is not the total answer; embryo transfer has to be used with modification. For example, what about the donor who is that super cow but doesn't milk? Concentrating that trait in some super calves, fed by dairy cows, doesn't do the breed any good. All aspects have to be considered before you want to produce 20-30 calves from your "ideal" cow. Is she actually "ideal" in every way?

On the other hand, we have a badly stifted cow here at Kinglore who was previously a great producer, so we heavily transferred her embryos and then shipped her. In the end, those great producers can go on producing.

Performance programs are built on individual performance. If there are 10 full brothers competing on test and one is outstanding, obviously it's his genetics you want to concentrate.

In summary, transplant is an exciting part of beef cattle production, spreading the offspring of great females as A.I. did with great bulls. But some degree of intelligent selection has to be used to make this highly effective system work most efficiently for the Angus breed.



**Earl Brake Jr.**  
DayBrake Ranch  
Nixa, Mo.

Embryo transfer appears an innovative technique to enhance the value and influence of the "super" cows in our breed. Its continued research and development could offer even greater possibilities such as sexing of offspring, super-ovulation and collection of eggs, longevity of the frozen egg, polygamous matings, etc.

The role embryo transfer will play in regards to the Angus female can be compared to some extent to the role A.I. has played in development of the herd bull influence in the last decade. At present there is a great vacuum separating the two procedures—and that is the affordability of A.I. in comparison to embryo transfer.

Many riders are approaching the promotional bandwagon behind embryo transfer at this time, scrambling for those "super" cows to produce those "super" calves. Now is the time to remember that only the really outstanding females with superior production capabilities in a reputable herd or young heifers of superior genetic background in a reputable herd are qualifying candidates for embryo transfer. Not only does the expense involved necessitate this qualifying credential, but the simple fact that to breed the really genetically superior animals that will produce the same, one must breed the best to the best because like begets like.



**Jack Logsdon**  
Lodgdon Angus  
Ranch  
Guthrie, Okla.

The decision to embark or not to embark on an embryo transfer program will be the most important decision you make in the registered cattle scenario. If you answer in the affirmative, you have the potential to be a viable factor in the future of Angus cattle. If you answer in the negative, you forfeit that privilege. Embryo transfer is the future as well as the present, and breeders failing to exercise that option make competition less for those who do; and competition is the name of the business whether it be in the show ring, performance testing or in the marketplace.

Once you make the move to transfer, important decisions must be made. The primary and glaringly apparent first step is



to ask yourself, "Do I have a matron of donor quality?" Probably you don't. Your best cow may be good; but can her 10, 15 or 20 full siblings average \$2,500 gross at weaning? If so, proceed to square two; if not, purchase one that will and then proceed to square two. Remember to add her acquisition price to what you need for each calf. I can't conceive of purchasing a legitimate donor for less than \$20,000. If a donor can net an individual \$500 a calf on, say, 20 calves a year, that would be a 50% return on your money. If you have a cow of that stature, you won't sell her for less. Neither will the individual with whom you are dealing. Admittedly, the figures used are an oversimplification, but the principle is valid and must be accepted.

Square two: Your next decision will be to transfer on the farm or to ship your donor cow(s) to a commercially available enterprise. If you choose the former, the cost will be considerably less, but you need two important assets: (1) An extremely capable veterinarian whose expertise lies in the field of embryo transfer and (2) your own ability and desire to maintain a larger-than-expected recipient herd and to follow strict rules and guidelines—dictated by the veterinarian.

After considering all of these and deciding to compete in the Angus business, your future will be exciting and progressive. After considering the above and deciding in the negative, you make it infinitely easier for those who do.

## **Bill Heck**

### **Heck's Angus Farm, Good Hope, Ill.**

A prime topic in the Angus business today is the embryo transplant program, something many breeders have pondered at one time or another. I believe this is an advanced program that a small percentage of breeders will be able to test and progress with.

It is time-consuming, expensive and not really practical for the majority of cattlemen. I think one needs to remember that 80% of the Angus membership registers 20 or fewer calves each year. I'm sure if a breeder were to go to the time and expense of raising embryo calves, he would want to register them. Thus, this small comparison would bear out that not many small breeders are going to indulge in it.

Also, I feel that the female used should be in the super-producing category, with proven genetics behind her and offspring already on the ground to prove her out. I think using too many poor cows could ruin the program. One small thing about the embryo female that bothers me is that she doesn't actually raise these calves. One must speculate at the growth pattern and gains of these calves from recipient cows. I think this point distracts from the program.

Another part analyze is the variation in cost. It seems transfer can cost from \$2,500 down to around \$700. With such a dif-

ference, it could start to increase problems such as death due to less management. I feel the expense alone is the one major point controlling embryo transplants right now.

Embryo transfer is not for all breeders, and I don't know how far this program will progress in the Angus business and what complications will develop. I'm sure it has its place, but I hope not too many breeders have fantasies about it.



**James Ottman**  
Rock Port, Mo.

The subject at any cattle function is embryo transplant. It is one of the modern-day wonders. This technique can advance a herd in one year to the same point that normally would take 10 years.

A tremendous amount of money, time and labor is invested in this project, so it is important to select a female in which you are confident and have adequate information to support her value.

The exciting thing about embryo transplant is the effect the program will

have on increasing the maternal genetics in your herd. It would pay anyone interested in an embryo program to spend a day with Larry Leonhardt at Shoshone Angus, Cowley, Wyo. Due to the Leonhardts' method of identifying females, it is quite obvious that females in that herd have a definite pattern with their progeny. Linebreeding, selecting and identifying certain female families with ideal traits have allowed the Leonhardts to breed some of the most superior animals available to the beef industry today.

The value of the superior Angus cow is at an all-time high due to her predictability and the technique of embryo transfer. In visiting many of the popular herds today, it is quite obvious which females carry the load so far as the bottom line (economics) is concerned. We feel this will become even more obvious as these good females are entered into an embryo program and allowed to express their genetic ability more rapidly.

In selecting females, one definitely should consider their economic importance as producers of high-performing progeny. The real beef world recognizes that the bottom line depends on pounds of calf produced and not the number of shows his sire has won! I encourage anyone with a female of the quality and predictability mentioned to try at least two of these females in an embryo program. It will give you an excellent opportunity to breed one cow to several

bulls and produce a lifetime of production in one year.

At present, we have a female in an embryo program. She has been responsible for 16 pregnant recipients in one year. We are going to be entering into an embryo program this summer in the development of new genetics for the Brangus breed.

I am very sold on the value of embryo transplant. The biggest risk involved, I feel, is putting all your eggs in one basket. In comparison, it is like a car traveling 100 mph and losing the front wheel versus a car at 50 mph. It would not be so bad if one car was just torn up twice as badly as the other. The real fact is it could be disastrous for the individual driving the car at 100 mph.



### **Far East Could Become Strong Market for U.S. Meat**

Japan, Singapore and Hong Kong will be premium markets for U.S. meat products in the Far East, according to Alan R. Middaugh, president of the U.S. Meat Export Federation (MEF).

"While Japan is obviously our best export market, we can look to Singapore to become our No. 2 market, followed closely by Hong Kong," Middaugh reported after returning from a 3-week market survey trip through Australia, Singapore and Japan.

"Tourism will be the key for expanding U.S. meat exports to Singapore."

