

Embryo Transfer—Who uses it?

By Kevin Reeser
Illinois State University

We hear about it. Everyone is familiar with its terminology. It's discussed in formal and informal conversations wherever Angus breeders gather. It's cursed. It's praised. It's referred to as the technology of the future that is here today. Yes... it is Embryo Transfer or simply E.T.

How often have you found yourself saying, "She has a great calf. I wish I had a pen full of them."

As breeders genetically improve their herds, embryo transfer is often considered as a way to make that improvement at a faster rate. But just how widespread is the use of embryo transfer? Just how satisfied are Angus breeders with their E.T. results? Do they consider E.T. to be financially successful?

During the fall of 1986, Illinois State University conducted a survey designed to answer these questions and many more like them. Every Illinois Angus breeder who was a member of the American Angus Assn. was mailed a survey, with one exception.

In those families with multiple memberships, only the senior member received a survey.

Out of a total of 811 surveys that were sent, 357 responses or 44 percent were returned. As surveys go, we considered this to be a very good response rate. In addition to the Illinois survey 50 prominent, nationally recognized Angus breeders throughout the United States were also sent the survey. Thirty-three of these selected breeders returned the survey giving us a response rate of 66 percent which is an excellent rate of response.

The survey contained a total of 31 questions. The first six questions of the survey were answered by every respondent whether or not they employed the use of embryo transfer and helped us characterize the type of breeders responding. The last 25 questions were only answered by those breeders using E.T.

Profiling the respondents

In general, both the Illinois and nationally selected respondents had owned purebred Angus cattle a similar amount of time. The majority of both survey groups had been in operation for 10-20 years. Illinois respondents reported smaller herd sizes than did the selected breeders. Typical herd size in Illinois was found to be 20-50 head while the majority of the selected breeders had herd sizes evenly split between 50-100 head and greater than 100 head.

When asked what percent of their cow herd was bred by artificial insemination Illinois breeders inseminated significantly fewer cows than did the selected breed-

ers. Selected breeders inseminated 50-80 percent of their cows while Illinois breeders inseminated only 30-50 percent of their cow herd. When asked if they showed cattle, 90.6 percent of the nationally selected breeders responded "yes," while only 47 percent of the Illinois breeders responded "yes." Additionally, respondents were asked if they showed on a local, state, or national basis, and selected breeders were found to show more at all three levels compared to Illinois breeders as a whole.

Showing, Pedigree, or Performance?

We also asked breeders on what basis they selected cows for artificial insemination. Breeders were given three choices and were asked to give each criteria a value rating from 1 (high) to 5 (low). While all three criteria received high ratings, performance was rated higher than pedigree which was rated higher than show ring winnings by both Illinois respondents and selected respondents. In other words,

Angus breeders are more apt to A.I. a cow based on her performance and pedigree than her show ring winnings. Interestingly, Illinois breeders were found to put significantly more emphasis on a cow's performance than were selected breeders.

Who Uses It?

Question 6 asked if breeders employed the use of embryo transfer. Significantly more selected breeders used E.T. than did Illinois breeders comparing 93.7 percent versus 15.0 percent, respectively. This suggests that while E.T. is widespread among elite breeders, its use is limited among typical breeders. These data suggest that while embryo transfer receives much publicity, its use is limited to a relatively few breeders. In general, a majority of Angus breeders do not use embryo transfer technology.

Surgical or Non-surgical?

For those breeders employing E.T., most of the transplanting was done non-surgically as opposed to surgically. Only

June 15, 1987

Jim Cotton, Editor
Angus Journal
3201 Frederick Blvd.
St. Joseph, MO 64501

Dear Jim:

Enclosed is a copy of a survey regarding embryo transfer and its use. You will also find a short article and some tables discussing the findings.

Last fall Kevin Reeser, an enthusiastic young Angus breeder, came to me wanting to know more about the relationship between Angus cattle and embryo transfer... how many breeders use it, how successful are they, etc. Apparently Kevin and his father, Ken, who owns K a R Angus Cattle at LeRoy, Illinois, have been using ET in their herd with some success. After some discussion, Kevin, who is a senior here at Illinois State University majoring in Agribusiness, decided to do a special problem on the subject. Under my direction and the direction of Dr. J.R. Winter, Kevin designed the enclosed questionnaire, tabulated the results and analyzed the data. Kevin did such a good job with the survey that the Illinois Academy of Science accepted an abstract submitted by Kevin, and in April of this year Kevin presented a scientific paper on the results of the survey at the annual meetings.

Over 90 percent of the respondents both nationally and in Illinois have requested the results of the survey. If after reading the enclosed material you too find the survey interesting and informative, it is my desire that you consider publishing the article in the *Angus Journal*. If you have any questions regarding the survey or the enclosed article, do not hesitate to call me. When you publish this article, feel free to select only those tables you find most pertinent.

Incidentally, Kevin has been very active in the Illinois Junior Angus Assn. in which he has served as a director for several years. Kevin has shown Angus on a national scale having exhibited the Reserve Champion Bred and Owned heifer at the Jr. National held in Nashville, Tennessee. Kevin has also shown the Grand Champion Heifer of the Jr. Show at the Illinois State Fair and is the breeder of the winningest Angus steer this year, Charger II, which recently won the American Angus Hall of Fame Steer Show.

Yours truly,

Paul Walker

Paul Walker, Associate Professor
Animal Science

June 23, 1987

Mr. Paul Walker, Associate Professor
Department of Animal Science
Illinois State University
150 Turner Hall
Normal, IL 61761

Dear Paul:

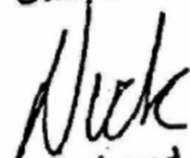
I received a copy of Kevin Reeser's recent research project in E.T. and its use in the Angus business. Let me congratulate Kevin on the paper and its findings.

You may be interested in knowing that 4,206 head of cattle were registered by E.T. in the Angus breed in fiscal 1985 and 4,307 head in fiscal 1986, which represents 2.4 percent of total registrations last year. I suspect the figure to increase slightly in fiscal 1987. This supports the finding that E.T. is used on a limited basis when surveying the entire membership. On the other hand, as prominent herds are selected as determined by showing, performance exposure or advertising in the *Angus Journal*, the percentage will increase significantly. I would assume a higher number of national herds were selected that show cattle with a 90.6 percent response to showing. My experience with a number of large herds with less emphasis on showing would indicate a lower percentage involved with E.T. Here I think of herds of 250-1,500 or more cows such as Sitz Angus Farm, Stevenson Angus Ranch, The Graham Company, etc. An interesting extension to the survey would be the breeders in the Angus business who recorded 100 or more registered Angus in 1986 (list attached).

The response to E.T. appears to be comparable nationwide as it is applied to various size herds and the slow growth of E.T. as reflected over the years in breeders involved and registrations indicate the frustrations that accompany the rewards of the E.T. program. The key to increased utilization of any program, such as E.T., is convenience and cost, both of which are prohibitive to many breeders looking at E.T. Nonetheless, it has proven to be a valuable tool to the propagation of superior genetics on whatever basis those genetics are evaluated.

Again, congratulations to Kevin on a fine paper.

Sincerely,



Richard L. Spader
Executive Vice President

20 percent of Illinois respondents practice single egg flushing while significantly more selected breeders utilized single egg flushing as an alternative. Significantly more of the selected respondents conducted on farm E.T. than did Illinois breeders comparing 86 percent versus 46 percent respectively.

Donor Cow Selection?

This survey found that a majority of donor cows have been shown, but when breeders were asked to give a value rating to show ring winnings, pedigree, and performance as criteria for selecting donor cows, show ring winnings received the lowest value. Again, as a criteria for selecting donor cows, Illinois breeders felt cow performance was more valuable than did selected respondents.

What Age?

Generally, selected breeders transplanted more cows per herd than did Illinois breeders as a whole. Significantly, more cows were transplanted within an age range of 3-7 years than were cows older than seven years of age. While fewer heifers are transplanted than are 3-7 year old cows, selected breeders transplanted significantly more heifers than did Illinois breeders. In fact, selected breeders reported transplanting nearly as many heifers as 3-7 year old cows.

Kinds of Recipients?

What type of recipient cows do breeders use? This survey found breeder use evenly distributed across four types of recipient cows—purebred Angus, dairy, dairy cross, and other. When breeders were asked if they thought registered Angus cows should be required for recipient cows, 36 percent of the Illinois breeders said "yes" while only 20 percent of the selected breeders said "yes." Overall, breeders employing E.T. do not favor limiting recipient cow type to only Angus cows. When asked to give a value rating to several criteria for selecting recipient cows, availability and milk production received the highest marks followed by disposition and cost.

Ratioed with Non-embryos?

When asked the following question "Regarding performance testing, should embryo calves be directly compared (ratioed) with non-embryo herd mates (contemporaries)?", 43 percent of the Illinois breeders said "yes" while a non-significant majority of 49 percent said "no." Eight percent had no opinion. Generally speaking, whether considering birth weight, weaning weight, or yearling weight, breeders were evenly split as to whether or not embryo calves should be directly compared with non-embryo herd mates.

Who's Satisfied?

Several questions were asked regarding breeder satisfaction with embryo transfer. Eighty percent of the Illinois breeders and 70 percent of the selected breeders felt

their best calf in 1985 was the result of E.T. Illinois breeders reported conception rates of 58.1 percent for fresh embryos and 45.5 percent for frozen embryos. Selected breeders were nonsignificantly higher in both categories reporting conception rates of 64.3 percent for fresh embryos and 50.9 percent for frozen embryos.

Fifty-eight percent of Illinois breeders thought that embryo transfer was cost-justified compared to 66 percent of the selected breeders. Only 40 percent of Illinois respondents said their embryo transfer program was cost effective while a nonsignificantly higher 60 percent of the selected respondents said their embryo transfer program was cost effective. When asked the question "Has your embryo transfer been financially successful, moderate, or a failure?", only 17 percent of Illinois breeders ranked their E.T. successful compared to 50 percent of selected breeders. When asked to clarify their satisfaction with embryo transfer, only 20 percent of the Illinois breeders were fully satisfied while 60 percent of the selected breeders were fully satisfied. A significant majority in both groups tested were satisfied 50 percent or more of the time with embryo transfer. It would seem, however, that selected breeders were as a whole more satisfied with their embryo transfer programs than were the Illinois breeders.

Cost of Methods?

Dollar cost for flushing embryos was reported to be somewhat less expensive for the selected respondents than for the Illinois respondents. Cost for freezing embryos were similar for both groups in their survey. Likewise, reported costs per pregnancy from either fresh embryos or frozen embryos were similar for both Illinois and selected breeders.

E.T. and Non-E.T. Cost Comparison?

Breeders were asked to estimate their cost per live calf produced from embryo transfer and from non-embryo transfer. Generally, selected respondents tended to have higher costs of production for both embryo and non-embryo calves compared to Illinois respondents. The costs of producing calves from embryo transfer is at the very best at least twice as expensive as the cost of production for natural calves. On the whole, the average cost of production values for non-embryo calves reported in this survey are quite similar to cost of production estimates by several well-known economists.

Three points become obvious upon analyzing the answers to these two cost of production questions. One, there is extreme variation in the reported costs of production between breeders as demonstrated by the very large standard devia-

tions associated with the costs. Two, many breeders apparently do not include the same items when estimating the cost of production. Three, it was evident from analyzing the surveys that too many breeders do not know the real cost of producing *non-embryo* calves. It was our opinion that several of the reported costs of producing natural calves were too low to be realistic.

To Prominent Breeders' Unfair Advantage?

Does embryo transfer give the "big

name" breeders an unfair advantage? Only 33.3 percent of Illinois respondents thought so. Twenty-eight point two percent said no and 38.5 percent had no opinion. "In your opinion, has embryo transfer been of benefit to the Angus industry?" A resounding 66.7 percent of Illinois respondents said "yes." At least 52.5 percent of the Illinois breeders plan to continue to use E.T. technology in the future at the same rate as before while 5.0 percent plan to increase its use. Only 27.5 percent plan to decrease the future use of embryo transfer in their herd.

In Summary?

This survey suggests that while most Angus breeders are aware of embryo transfer, only a few breeders utilize E.T. technology. Those Angus breeders that do employ embryo transfer in their herds plan to continue to do so in the future. In general, a significant majority of those responding to this survey did believe that E.T. has been of benefit to the Angus industry. **AJ**

BASIS FOR SELECTING RECIPIENT COWS¹

Trait	Mean
Milk production	1.84
Disposition	2.25
Maternal Performance	3.03
Breed	2.91
Cow size	2.6
Cost	2.3
Availability	1.95

¹High = 1, Low = 5

DONOR COW TYPE

Breeder	Heifer	Cow 3-7	Cow >7
.01 Illinois	.73	1.75	.55
.01 Selected	7.13	8.44	1.4

*Numbers within a row differ (P < .05).

**Numbers within a column differ (P < .01).

HAS E.T. BEEN OF BENEFIT TO THE INDUSTRY? (%)

Yes	66.7*
No	33.3*

*Numbers differ (P < .05).

LEVEL AT WHICH BREEDERS SHOW (%)

Breeder	Local	State	National
Illinois	43	27	17
Selected	63	84	81

EMPHASIS OF PEDIGREE, PERFORMANCE AND SHOW RING ON SELECTION

Trait	Basis for selecting A.I. Cows ¹		Basis for selecting Donor Cows ¹	
	Illinois	Selected	Illinois	Selected
Show ring winnings	2.56*	2.62*	1.84*	2.33*
Pedigree	1.91*	2.00*	1.33	1.56*
Performance	1.37**	1.81**	1.33**	1.76**

¹ High = 1, Low = 5

* Numbers within a column differ (P < .05).

**Numbers within a paired row differ (P < .01).

CHARACTERIZATION OF BREEDERS RESPONDING

Breeder	Years of Operation	Size of Herd	% Cows Bred A.I.	% Practice E.T.	% Show
Illinois	10-20	20-50	30-50**	15.0**	47.0**
Selected	10-20	50-100 > 100	50-80**	93.7**	90.6**

**Numbers within a column differ (P < .01)

CHARACTERIZATION OF RECIPIENT COWS (%)

Breeder	Angus Cows Only—yes	P.B. Angus	Dairy	Dairy Cross	Other
Illinois	36	35.3	25.6	25.4	14.9
Selected	20	28.4	31.1	20.4	20.1

SHOULD EMBRYO CALVES BE DIRECTLY COMPARED WITH NON-EMBRYO CALVES? (%)

Trait	Yes	No	No Opinion
Generally	43	49	8
Birth wt.	50	44	6
Weaning wt.	41.7	50	8.3
Yearling wt.	55.6	38.9	5.5

BREEDER SATISFACTION WITH E.T.

Breeder	Conception Rate (%)			Best Calf (%) ¹	Cost Justified		Cost Effective		Financially			Satisfaction with E.T.				
	Frozen	Fresh	Fresh		Yes	No	Yes	No	Succ	Mod	Fail	Fully	50-80%	50%	20-40%	Not
Illinois	45.5	58.1	80.0	58	42	40+	60+	17+	68+	15	20	54	22	2	2	
Selected	50.9	64.3	70.0	66	34	60+	40+	50+	33+	10	60	-	30	-	10	

¹Percent responding yes that their best calf in 1985 was an E.T. calf.

†Numbers within a column differ (P < .1).

COST OF E.T. (%)

Item	0-\$150		\$150-250		\$250+	
	I	S	I	S	I	S
Flushing	16.7%	53.5%	61.1%	35.7%	22.2%	10.7%
Freezing	87.1%	64.3%	12.9%	10.7%	0	21.4%
Fresh						
preg.	16.7%	10.7%	36.1%	21.4%	47.2%	64.3%
Frozen						
preg.	10.0%	10.7%	53.3%	28.5%	36.7%	57.0%

I = Percent of Illinois breeders in each category.

S = Percent of selected breeders in each category.

CHARACTERIZATION OF E.T. (%)

Breeder	On Farm E.T.	Non surgical E.T.	Single egg flushing	% donors shown	mean ¹
Illinois	46**	88	20**	60-99	1.88
Selected	86**	87	50**	60-99	1.66

¹ <50% = 1, 60-99% = 2, 100% = 3

**Numbers within a column differ (P > .01)

LIVE CALF COST (%)

Breeder	From E.T.	Non E.T.
Illinois	\$ 984.51±572.65	\$470.43±373.50
Selected	1,334.00±555.00	551.00±366.00

REGARDING THE FUTURE OF E.T., DO YOU THINK ITS USE WILL . . . (%)

	In Your Herd	In Other Breeder Herds
Increase	5.0	23.0
Stay about the same	52.5	33.0
Decrease	27.5	41.0
Do not know	15.0	2.6