



By the Numbers

► by **Sally Northcutt**, director of genetic research, American Angus Association

What's in a recip?

What makes one recipient female better than another? When it comes to embryo transfer (ET) calves and performance information through Beef Improvement Records (BIR), there is a difference.

Production of Angus seedstock via the use of ET continues to grow. Nearly 13% of calves registered are the result of embryo transplant. With this advancement, there has also been an increase in the use of registered Angus females as recipient cows to raise ET calves.

Recognizing these trends, procedures have been enhanced to allow the use of performance data collected on ET calves in the National Cattle Evaluation (NCE) and interim expected progeny difference (EPD) calculations.

In order to accurately include performance data on ET calves, it is necessary to characterize the impact that the recipient female has had on that calf's performance. The recipient is the "maternal factor" in the ET production cycle.

Maternal effects

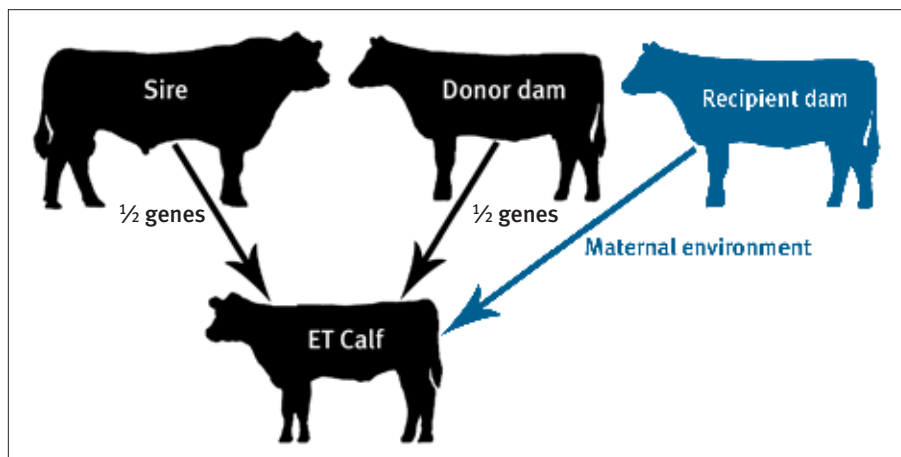
Preweaning growth in cattle is influenced by maternal effects. As a review, maternal effects are environmental with respect to the calf (e.g., mothering ability and milk received from the calf's dam) and genetic with respect

to the dam that rears the calf. The dam that nurses the calf has genes that make her a good mother or a bad mother. This situation becomes a necessary part of breaking out the genetic contributions to preweaning trait performance, such as birth weight and weaning weight.

ET calves receive a random sample of their genes, half coming from the sire and half from the donor dam. The recipient female that carries and subsequently raises and weans the calf contributes the environment. Thus, the donor dam contributes only genetic effects, with no contribution to the maternal environment (see Fig. 1).

These pieces affect how the EPDs for birth weight, weaning weight and milk are computed. Think of it as a three-parent model, where the recipient dam is a third parent whose genetics influence the maternal environment provided to the calf.

Fig. 1: Contributors to the performance of ET calves



Known or unknown recipient female

If the recipient female is unknown (is not a registered Angus female), then the necessary information is not known about her to calculate the maternal contributions. Her pedigree is not available through the American Angus Association's database to fit her as the third parent in interim or NCE procedures. The calf's own birth and weaning weights could not contribute to the EPD calculations, even when represented in a valid contemporary group. The ET calf in Fig. 2 has pedigree-estimated EPDs with an accuracy (Acc) equal to 0.05.

It is important to note that if the parents of the calf in Fig. 2 had not had NCE EPDs to calculate the pedigree estimate for the calf, then the EPDs would have been blank. For more information on interim EPDs and the necessary components for their calculation, see the October 2008 "By the Numbers" column or visit www.angus.org/performance/documents/interim_epd.html.

In contrast, the ET calf in Fig. 3 has a registered Angus recipient dam. The calf has a valid weaning weight from a valid contemporary group, with all calves in the group raised by registered Angus recipients. For more details about contemporary grouping, see the March 2008 "By the Numbers" column or review the materials at

Fig. 2: ET calf EPDs with unknown recipient dam

Production						Maternal					
CED	BW	WW	YW	YH	SC	CEM	Milk	MkH	MW	MH	\$EN
Acc	Acc	Acc	Acc	Acc	Acc	Acc	Acc	MkD	Acc	Acc	Acc
+5	+4.3	+37	+72	+4	+80	+6	+28		+38	+5	+1.04
.05	.05	.05	.05	.05	.05	.05	.05		.05	.05	

Fig. 3: ET calf EPDs with registered Angus recipient dam

Production						Maternal					
CED	BW	WW	YW	YH	SC	CEM	Milk	MkH	MW	MH	\$EN
Acc	Acc	Acc	Acc	Acc	Acc	Acc	Acc	MkD	Acc	Acc	Acc
+4	+3.4	+54	+103	+9	+82	+7	+21		+55	+1.0	-1.33
.26	.39	.32	.27	.05	.05	.12	.19		.05	.05	

www.angus.org/performance/documents/contemporary_grp.html.

Age of the dam of the registered Angus recipient is used in the computation of the 205-day weaning weight used in the EPD calculations. The age of the donor dam would have no consequence to the 205-day weight adjustment, since she only contributes to the genetic effects for weaning weight. Also, note that the accuracies on the calf out of the registered Angus recipient reflect the inclusion of the calf's own performance record.

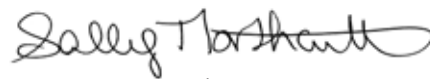
What about other traits?

In traits where maternal genetic effects are not partitioned in the evaluation for EPDs, the ET calf's own record for an appropriate contemporary group may be utilized. Examples of this would include scrotal circumference, yearling height and ultrasound.

Summary

ET calves from registered Angus recipient dams allow potential for the calf's own performance record through yearling age to be used in interim and NCE procedures. By tracking the contributions of the registered

Angus recipient's pedigree, the maternal genetic components of the evaluation models can be calculated.



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Editor's Note: "By the Numbers" is a column by Association performance programs staff to share insights with Angus members about data collection and interpretation, the National Cattle Evaluation (NCE), genetic selection, and relevant technology and industry issues. If you have questions or would like to suggest a topic for a future column, contact Sally Northcutt, director of genetic research, or Bill Bowman, director of performance programs, at 816-383-5100.