FARM Assistance Focus

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Economic Impact of Beef Cattle Best Management Practices in South Texas: Embryo Transfer in Pure Breed Cattle Operations

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Embryo transfer is used primarily by purebred cattle producers to significantly improve their genetic pool.

Pure breed cattle operators in South Texas and across the state are constantly evaluating and implementing the best or most practical management practices to improve their herds. Breeders are routinely affected by the economy, cattle markets, drought, and rising production costs. In most instances, operators are often forced to utilize off-ranch income to supplement ranching operations. Ranchers are also able to use wildlife as another source of income.

Strategic or best management practices greatly assist cattle breeders in improving their herd quality, performance, and profitability. A few of these practices are supplemental feeding, breed selection, pregnancy testing cows, breeding soundness exam (BSE) for bulls, artificial insemination (AI), and embryo transfer (ET). This case study will evaluate ET in a typical pure breed cattle operation.

Assumptions

The Financial And Risk Management (FARM) Assistance strategic planning model was used to evaluate and illustrate the individual financial impacts of ET on a model South Texas pure breed ranch. The ranch is assumed to have 800 acres with 95 cows (1 animal unit to 8-acre stocking rate) and 4 bulls (1 bull to 25 cows). The general assumptions and characteristics are given in Table 1. Production inputs, yields, costs, and estimates for overhead charges were based on typical rates for the region. Hunting income was $7/acre in 2009. The assets, debts, machinery inventory, and scheduled equipment replacements for the projection period were the same in the management scenarios. It is assumed the ranch has only intermediate term debt. Cattle prices used were from the Live Oak Livestock Commission Company auction report in Three Rivers, Texas, for May 4, 2009. Prices for heifer and bull calves, cows, and bulls were adjusted to reflect expected weighted average pure breed prices.

A typical pure breed ranch was assumed to incorporate BSE and pregnancy testing cows with a 95% calving rate. The average cost for BSE is $73.25/ bull or $293.00/year (4 bulls) and $85.75/ bull and $171.50/year (2 bulls). The average rate for pregnancy testing is $6.50/cow or $520/year. These rates are based on a vet ranch visit expense and per head charge.

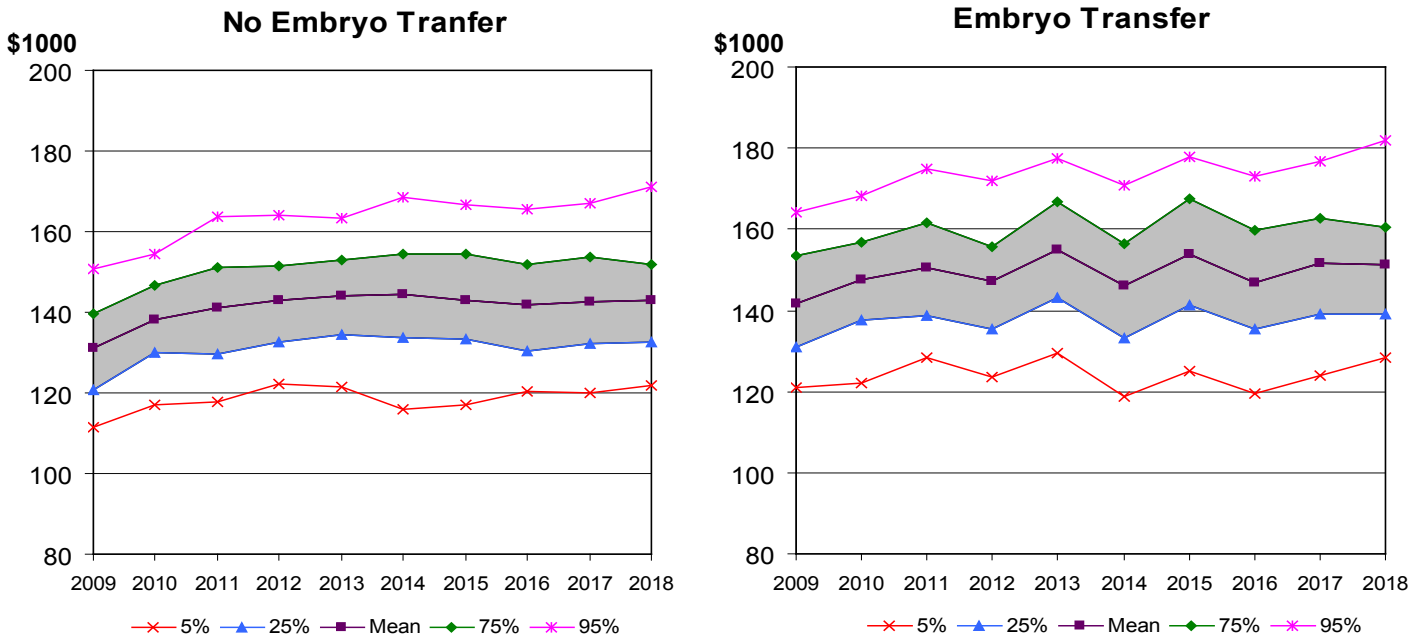
ET is used primarily by purebred cattle producers to significantly improve their genetic pool. Calves born from ET are full-sibs (same sire and same dam) unlike calves from AI breeding that are half-sibs (same sire but different dams). Full-sibs improve genetic uniformity and performance in the desired traits faster than half-sibs. In an ET program, selected cows (which should be outstanding genetically) are given a series of injections of follicle stimulating hormone to increase the number of follicles or eggs produced by her two ovaries (rather than just one or two as is usual). These cows are called "donor" cows as they will donate their eggs when fertilized to other surrogate cows (known as "recipients"). The recipient cows will grow the transferred embryo to term and calve in 9-1/2 months.

As in AI, 48-72 hours post ovulation, 2-3 straws of semen are deposited to maximize the number of pregnancies. At about 7 days post insemination the fertilized eggs are collected by irrigating or "flushing" the eggs from the donors cows reproductive tract. The eggs are then graded for development stage and are implanted

Table 1: 2009 Assumptions for 95-Cow South Texas Representative Pure Bred Ranch

Selected Parameter	No ET	With ET
Operator Off-Farm Income	$24,000/year	
Spouse Off-Farm Income	$35,000/year	
Family Living Expense	$30,000/year	
Ownership Tenure	100%	
Ranch Size	800 acres	
Royalty Income	Not Included	
Hunting Income	$7/acre	
Herbicide Costs/Acre	$1.50	
Part-Time Labor	$1,000	$1,450
Number of Bulls (95 cows)	4 bulls	2 bulls
ET Donors	N/A	15 cows
Cow Herd Replacement	Bred cows	
Vet, Medicine & Supplies	$25/cow	
Salt/Mineral Blocks/Year	$20/cow	
Hay Fed/Cow/Year	1.5 tons	
Protein Cubes Fed/Cow/Year	150 lbs.	
Cow Culling Rate/Year	7.5%	
Calving Rate	95%	
Bull Calf Prices (wt. avg.)	$2,145/hd	$2,360/hd
Heifer Prices (wt. avg.)	$2,175/hd	$2,393/hd
Cull Cow Prices	$.50/lb.	
Cull Bull Price	$.62lb.	
Bred Cow Price	$2,000/head	
Replacement Bull Prices	$3,700/head	
Et Donor Cows	N/A	$5,000/hd
Hay Prices	$135/ton	
Range Cube Prices	$0.18/lb.	
Creep Feed Pricing	$.16/lb.	
Pregnancy Testing	$6.50/cow	
BSE Testing	$73.25/bull	$85.75/bull
Synchronization Shot	N/A	$15/cow
Vet/Technician Fee & Embryo	N/A	$125/cow

Figure 1: Projected Variability in Net Cash Farm Income



in the recipient cows that were synchronized earlier and are now in heat.

In this ET scenario, it was assumed that 15 donor cows were needed to have sufficient embryos for the 80 recipient cows. The ET process required 4 visits by a vet or technician. In the first visit, the donor cows are brought into estrus synchronization through drug injection. Artificial insemination is used to breed the donor cows in the second visit. The 80 recipient cows are brought into estrus synchronization in the third visit. The cost of synchronization is $15 per cow. The donor cows have their embryos flushed on the fourth visit, and, on average, 6.3 embryos are produced per flush. The recipient cows are then implanted with the embryos. The cost of ET is assumed to be $125 per cow.

A 50% initial conception rate from ET is expected and these cows are assumed to be bred within a one week window. It is expected that all cows are bred within a 1-week to 60-day window. With ET, only 2 bulls are necessary to cover the open cows reducing the number of bulls from 4 to 2 needed in the operation.

Calving weights are expected to increase with ET due to improved genetic quality and larger weaned calves due to the shortened calving season. Genetics improve by the use of semen from only top quality bulls. ET will allow 50-60% of the calves to be born within the first week of the calving season. The remaining cows that do not take to ET are bred by the 2 clean up bulls and normally have calves born within a 60-day period.

The genetic influence as well as the shortened calving season will result in a 50 lb. increase in weaning calf weights on average. Improved genetics and consistency are expected to increase calf value by 10% (Table 1). Calves will also be allowed to free choice creep feed to help promote growth.

Normal part-time labor costs for the ranch is about $1,000 per year. The ET process requires that cattle be run through the shoot four separate times and an extra $450 day labor is added. It was assumed that 4 people will be needed for the entire ET process. These include the vet or technician,

Table 2: Projected Financial indicators (2009-2018)

Scenario	10-Year Averages				Cumulative 10-Yr Cash Flow/Cow ($1000)
	Total Cash Receipts ($1000)	Total Cash Costs ($1000)	Net Cash Farm Income ($1000)	Net Cash Farm Income/Cow ($1000)	
No Embryo Transfer	216.42	75.17	141.25	1.49	12.11
Embryo Transfer	234.90	85.75	149.14	1.57	12.70
Embryo Transfer (Open Donors)*	199.76	83.78	115.99	1.22	10.52

* Assumes 15 donor cows are left open.

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the operator, and 2 extra day laborers at $75/day per hand.

The base year for the 10-year analysis of the model ranch is 2009 and projections are carried through 2018. Commodity and livestock price trends follow projections provided by the Food and Agricultural Policy Research Institute (FAPRI, University of Missouri) with costs adjusted for inflation over the planning horizon. Representative measures, including profitability and liquidity were chosen to assess the financial implications of each scenario. Profitability measures the extent to which a farm or ranch generates income from the use of its resources. Net cash farm income (NCFI) is one measure of profitability. Liquidity measures the ability of a farm or ranch to meet its short-term financial obligations without disrupting the normal operations of the business. The liquidity of the operation may be measured by the ending cash balance. Each measure provides information with respect to the projected variability in the ranches financial position and performance. When taken as a whole, the analysis provides insight into the risk and return expectations of the ranch throughout the planning horizon under each management practice.

Results

A comprehensive financial projection, including price and weaning weight risk, is illustrated in Table 2 and Figure 1. Table 2 presents the average outcomes for selected financial projections, while the graphical presentations illustrate the range of possibilities for the selected variable.

An annual ET program offers the potential for improving profitability and financial performance of a pure breed, cow-calf operation (Table 2 and Figure 1). Net cash farm income averages $141,250 per year for the operation or approximately $1,490/cow/year (assumes 95 cows) with no embryo transfer. With ET, NCFI averages $149,140 or about $1,570/cow/year (assumes 15 donor cows and 80 recipients). This represents a $7,890 or 5.6% increase in projected profitability. NCFI increases $80/cow/year primarily due to improved genetics. If the donor cows are left open, average NCFI declines approximately $26,260 or $266/cow/year compared to not using ET.

Ending cash reserves is a measurement of liquidity. Over the 10-year projection, ending cash reserves grow by $55,610 or 4.8% more in the ET scenario than the no ET scenario (Table 2). Off-farm income contributes somewhat to the cash flow of the operation in both the ET and no ET scenarios.

Implications

Implementing strategic or best management practices presents a pure breed cattle producer with the potential to improve herd performance and profitability. Ranchers are also able to supplement livestock revenues with off-farm employment, hunting and other income sources. Actual results will likely vary by producer and operation; however, cow pregnancy testing and culling open cows, BSE testing and culling infertile bulls, and embryo transfer offer opportunities to improve a ranch's bottom line. A judicious manager will evaluate and implement practices that fit his or her management style and operation.

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