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## **Long Term Financial Impacts of Drought Management Strategies**

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### **Abstract:**

This paper analyzes the financial implications of drought management strategies for a model ranch in South Texas. The 2006 drought that affected Texas livestock producers left many cattlemen asking the age old question, “Should I cull to reduce my herd size or purchase feed to maintain my current herd”.

Many South Texas counties have been adversely affected by drought situations since November 2005. Livestock ranches and cattlemen in this area have responded by implementing different management strategies to reduce the effects of low rainfall totals and loss in forage production. To offset the loss in forage during a drought, supplemental feeding is generally increased as well as the culling of cow herds at heavier than normal rates. Since hay shortages have been felt across all of Texas during the 2005-2006 growing season, cattlemen have seen a substantial increase in supplemental feeding expenses. Coupled with culling and herd replacement costs after a drought, livestock ranches are seeing how these management strategies impact their financial well-being.

### **Assumptions**

The Financial And Risk Management (FARM) Assistance financial planning model was used to evaluate and illustrate the individual financial impacts of a prolonged drought on a representative (hypothetical) commercial cow-calf ranching business in South Texas. The program known as FARM Assistance is founded in stochastic farm-level research methods.

Developed as an outreach program by Texas Cooperative Extension, the complex research tool is

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made available to any Texas Producer. In essence, FARM Assistance is a decision support system (DSS) which addresses the decision steps of formulating and evaluating business alternatives. A DSS like FARM Assistance can simplify the evaluation step for farm managers, increasing the likelihood that they will use more formal and accurate evaluations of alternative strategies (Klose and Outlaw, 2005). Kaase, et al (2003) describe the FARM Assistance process as a unique combination of a state-of-the-art computerized decision-support system and extension risk management specialist working one-on-one with producers to provide individualized economic and risk assessment evaluations. As Klose and Outlaw (2005) explain, the philosophy of the FARM Assistance analysis process is to provide information to help producers choose among long-term strategic alternatives. To accomplish that objective, the first step is to create a baseline. The baseline represents the current strategic plan for moving the operation through a 10-year planning horizon. The baseline then serves as a benchmark for comparing the financial implications of alternative plans.

This study looked at two scenarios commonly utilized during drought situations; purchase feed to keep herd size numbers the same (Scenario 1) and sell cows to reduce herd size by 20% (Scenario 2). The representative ranch chosen was a 2,000 acre ranch located in DeWitt County with the basic assumptions and characteristics given in Table 1. Production costs and estimates for overhead charges were based on typical rates for the region. Cattle prices were obtained from a representative south-central Texas livestock commission report for March 10, 2006. A similar study was conducted by Young, Paschal, Hanselka, Klose, & Jupe (2006) which compared a representative ranch in South Texas during normal rainfall and extended drought situations. In that study, the authors found that in the two-year drought scenario, the profitability

of the ranch was severely impacted over the ten year planning horizon. In our study, both scenarios are exposed to the same drought conditions, only management strategies are different.

The representative ranch was analyzed over a 10-year period. In scenario 1 where the cow herd size remained constant and additional feed (hay & supplement) was purchased, a 10% replacement rate was used in each of the 10 years. The base year for the analysis is 2006 and projections are carried through 2015. The assets, debts, machinery complement, and scheduled equipment replacements for the projection period were the same in both of the scenarios. Long-term 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.

The projected financial position and performance was evaluated across five major categories including liquidity, solvency, profitability, repayment capacity and financial efficiency. Representative measures were chosen for each of these five categories and are presented in tabular and/or graphical format for each scenario. Each measure chosen provides information with respect to the projected variability in the ranches financial position and performance. When taken as a whole, these measures provide insight into the risk bearing ability of the ranch throughout the planning horizon.

**Table1.** Representative South Texas Ranch Assumptions

<b>Selected Parameter</b>	<b>Purchase Feed – Maintain Cow Herd Size (Scenario 1)</b>			<b>Sell Cows to Reduce Herd Size (Scenario 2)</b>		
Operator Off-Farm Income	\$24,000			Same		
Spouse Off-Farm Income	\$35,000			Same		
Family Living Expense	\$30,000			Same		
Ownership Tenure	100%			Same		
Debt Situation	Low			Same		
Initial Herd Size	200 cows, 8 bulls			Same		
Calf Weaning Rate	85%			Same		
Herd Replacement	Bred Heifers			Same		
Supplemental Feeding	Salt/Mineral Blocks			Same		
Hay Fed/Cow/YR 2006	4.0 tons			3.5 tons		
Hay Fed/Cow/YRS 07-15	2007 - 2.5 tons    2008–2015 – 1.2 tons			2007- 2.25    2008-2015 – tons    1.2 tons		
Protein Cubes Fed/Cow/Year	2006 - 400 lbs	2007 - 300 lbs	2008→ 200 lbs	2006 - 360 lbs	2007 – 300 lbs	2008→ 200 lbs
Cow Culling Rate/Year	10%			20% in 2006, 10% 2007-2015		
Steer Weaning Weights	525 lbs			Same		
Heifer Weaning Weights	475 lbs.			Same		
Steer Prices	\$1.25/lb.			Same		
Heifer Prices	\$1.18/lb.			Same		
Cull Cow Prices	\$0.48/lb.			Same		
Cull Bull Prices	\$0.48/lb.			Same		
Bred Heifer Prices	\$855/head			Same		
Replacement Bull Prices	\$2,500/head			Same		
Hay Prices	\$135/ton-2006, \$110/ton-2007, \$85/ton – 2008-2016			Same		
Range Cube Price	\$.08/lb.			Same		

## Results

A comprehensive financial projection including price and weaning weight risk of the two different scenarios are illustrated in Table 2 and Figures 1 and 2. Table 2 represents the average outcomes for selected financial projections, while the graphical presentations (Figures 1 & 2) illustrate the range of possibilities for the selected variables. Total cash receipts average \$108,860 over the 10-year period for the scenario which looks at maintaining the current cow herd size and buying supplemental feeds, 4.8% more than the scenario which reduces the herd size in 2006. However, if we take a look at the initial year of the projection (2006), we see that total cash receipts for scenario 2 averages \$139,620 or 8.2% more in receipts than scenario 1.

This reflects the 20 % culling of cows in scenario 2 in 2006. From 2007-2010, the total cash receipts are much lower in scenario 2 due to smaller herd size. The lower cash receipts in scenario 2 reflect herd culling in 2006 and then rebuilding the herd in 2007 – 2010. Average cash costs were \$165,530 in 2006 for scenario 1 which maintained the current herd size, while average cash cost for scenario 2 in 2006 was \$134,446. This is a difference of 23.1% in cash costs in 2006. Looking at the 10 year average, the study found only a 4.9% difference in cash costs, with scenario 1 averaging \$99,120 in cash costs and scenario 2 averaging \$94,449 in total cash costs.

**Table2. Representative Ranch Financial Projections – Selected Indicators**

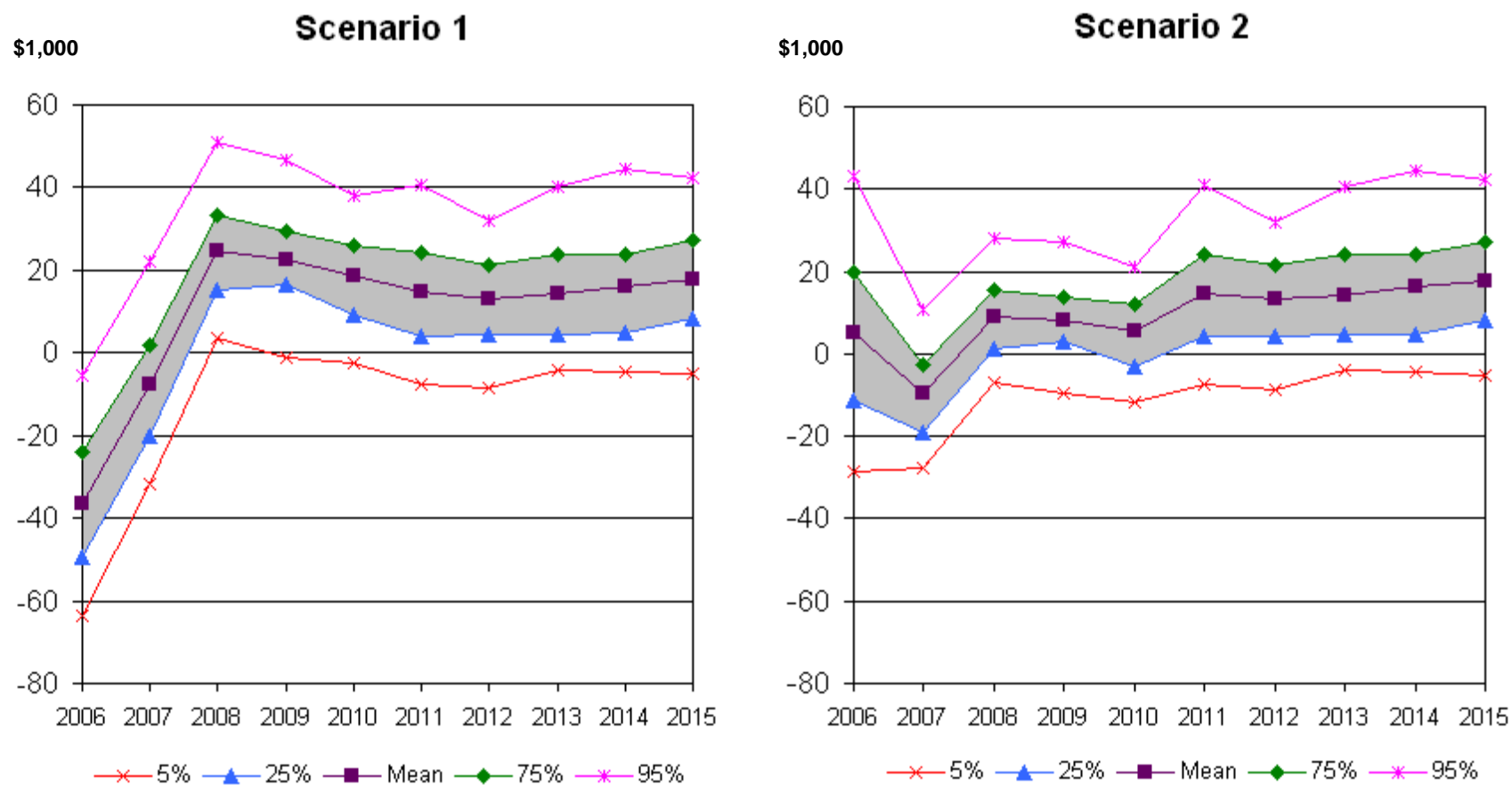
<b>Scenario</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>Avg.</b>
<b><u>Total Cash</u></b>											
<b><u>Receipts (\$1,000)</u></b>											
Maintain Herd	129.02	122.09	114.56	108.94	104.45	101.17	99.32	100.44	103.15	105.43	108.86
Herd Culling	139.62	99.55	95.97	96.07	97.96	101.17	99.32	100.44	103.15	105.43	103.87
<b><u>Total Cash</u></b>											
<b><u>Costs (\$1,000)</u></b>											
Maintain Herd	165.53	129.85	89.90	86.53	85.78	86.62	86.13	86.30	86.97	87.60	99.12
Herd Culling	134.45	109.20	86.99	87.91	92.33	86.62	86.13	86.30	86.97	87.60	94.45
<b><u>Net Cash Farm</u></b>											
<b><u>Income (\$1,000)</u></b>											
Maintain Herd	-36.51	-7.76	24.67	22.41	18.67	14.56	13.19	14.14	16.18	17.83	9.74
Herd Culling	5.18	-9.64	8.98	8.16	5.63	14.56	13.19	14.14	16.18	17.83	9.42
<b><u>Ending Cash</u></b>											
<b><u>Reserves (\$1,000)</u></b>											
Maintain Herd	-2.89	11.40	47.20	85.53	129.53	163.20	196.94	232.03	269.14	307.90	144.00
Herd Culling	35.78	43.33	67.10	94.26	126.47	161.05	195.72	231.62	269.37	308.38	153.31
<b><u>Real Net Worth (\$1,000)</u></b>											
Maintain Herd	1,831.37	1,848.78	1,872.51	1,889.87	1,896.15	1,909.82	1,934.20	1,974.20	2,023.03	2,070.90	1,925.08
Herd Culling	1,834.42	1,851.59	1,873.01	1,889.26	1,895.02	1,909.15	1,933.90	1,974.22	2,023.32	2,071.30	1,925.52
<b><u>Debt-to-Asset Ratio (%)</u></b>											
Maintain Herd	11.43	10.98	10.51	10.36	11.19	10.93	10.69	10.49	10.29	10.09	10.69
Herd Culling	10.96	10.71	10.39	10.27	11.12	10.88	10.66	10.47	10.29	10.09	10.58

Although profitability over the ten-year period between the two scenarios is not greatly different, in 2006 there is a 14% difference in Net Cash Farm Income between herd culling (scenario 2) and maintaining the herd (scenario 1). Net cash farm income (NCFI) for 2006 is projected to be -\$36,510 for the scenario which maintains the current herd size and \$5,180 for the herd culling scenario (Table 2, Figure 1). For 2006-2015, NCFI is projected to average

\$9,740 for scenario 1 and \$9,420 for Scenario 2. The negative NCFI in 2006 for scenario 1 is largely due to the increased feeding costs associated with feeding 200 cows, while the NCFI for scenario 2 portrays receipts from culled cows as well as a reduction in feed costs. In the years required to rebuild the herd, the profitability advantage is in scenario 1 where average NCFI is \$14,497.50 compared to only \$3,282.50 for scenario 2, where the herd size is smaller and the ranch is purchasing replacements to rebuild capacity. Over most of the 10 year projection, cash receipts are projected to generally decline along with the projected cattle prices. Figure 1 also illustrates the risk in NCFI, with the range indicating profit levels from approximately -\$63,800 to \$44,300 for the scenario which maintains the current herd size (scenario 1) and -\$28,500 and \$44,300 under scenario 2 (culling the herd size). These ranges suggest that there is significant risk of operating losses over the projected period. The shaded area of the graph suggest that the operation is expected to have a 50% chance of realizing a -\$49,100 to \$27,100 profit level in scenario 1 and -\$19,100 to \$27,100 in scenario 2.



**Figure 1. Projected Variability in Net Cash Farm Income for the South Texas Representative Ranch.**



Note: Percentages indicate the probability that Net Cash Farm Income is below the indicated level.  
The shaded area contains 50% of the projected outcomes.

The liquidity of the ranch is measured by the ending cash balance (Table 2, Figure2). This figure shows the impacts of each of the two scenarios on the risk associated with ending cash balances by pointing out the probability that ending cash will fall below zero, requiring a carryover debt. In scenario 1, average ending cash values are projected to range from -\$2,890 to \$307,900 during the ten-year period. This compares to the average ending cash values in scenario 2 which are projected to range from \$35,780 to \$308,380. Figure 2 illustrates average ending cash balances and risk of cash shortfalls. During the first two years of the study, scenario 1 has a 62% and 26% probability of carryover debt, while scenario 2's probability of carryover debt is minimal.

Overall equity and solvency measures are similar between the two scenarios. The Real Net Worth values for scenario 1 average \$1,925,080 over the 10 year period while scenario 2 averages \$1,925,520 (Table 2). Likewise, the ten-year average debt to asset ratios between scenario 1 and 2 are 10.69% and 10.58% respectively.

## **Implications**

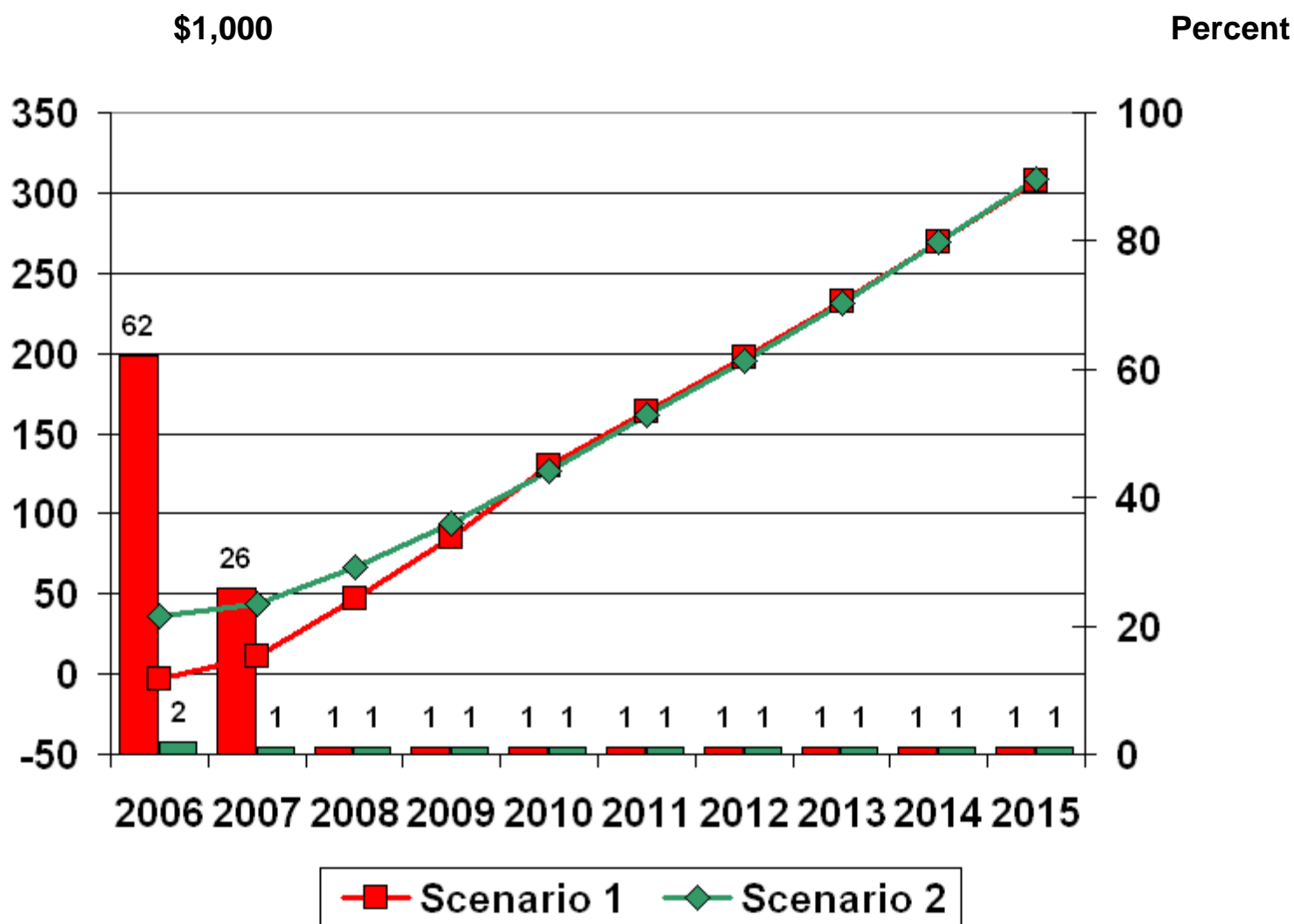
Some observations that may affect management decisions in future droughts include:

- Current high cattle prices may be masking the effects of drought and high feeding costs
- With the high cattle prices and the hay shortage today, the best management options may not be the same as during cyclic periods of low cattle prices and low or high hay costs
- A producer must weigh the future cost of herd replacement when making decisions to cull and how much to cull

- Ability to “manage” a drought is directly affected by the operation’s debt situation.

The projected results of this study further depict why these two strategies of herd management are continually discussed during drought situations. Unfortunately, there is still no clear cut answer on which strategy is the most beneficial to livestock producers long-term. Each individual operation must assess their short and long term goals and decide for themselves on which management strategy would be the most valuable.

**Figure 2. Ending Cash Reserves and Probability of Having to Refinance Operating Note for the South Texas Ranch.**



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