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Economic Impact of Beef Cattle Best Management Practices in South Texas: Stocking Strategies during Drought

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ABSTRACT

In a drought situation, forage is normally reduced due to lack of adequate moisture. Moreover, the availability of hay may become limited, and hay prices often escalate. Cow-calf producers are faced with the integral decision to maintain their herds and supplemental feed or reduce the herd to minimize feeding requirements and costs. The management decision to maintain versus destock can significantly impact producer profits and financial position. This paper illustrates the financial implications of alternative management stocking strategies in a drought situation optimizing profitability of ranching operations.

KEYWORDS

drought management, stocking strategies, financial, profitability

INTRODUCTION

Cow-calf producers in South Texas had to make tough management decisions due to the prolonged 2011 drought. The total annual rainfall in 2011 for Corpus Christi, Texas, was slightly over 12 inches, about 20 inches or 62% below average. Most locations across South Texas received 15–40% of average rainfall. It became apparent in early 2011 that it would be a dry year. Total rainfall between October 1, 2010, and May 31, 2011, was only 5.82 inches, compared to 18.31 inches in an average year. But predictions of the drought prolonging into 2012 raised significant concerns for the impact on producers' bottom lines. Management decisions often revolve around feeding versus destocking herds. Reduced forage and hay availability, along with escalating hay and high cattle prices, complicated the decision-making process. Average hay prices increased about 90% from 2010 to 2011, and cattle prices were up about \$0.20–\$0.25/pound.

Successful managers need to evaluate and implement cost-effective strategies to sustain operations and minimize losses during drought-stricken years. To accomplish this, producers must identify their best management practices or strategies to improve or sustain herd performance and ranching profitability. These may include reducing stocking rate, culling older or low-performing cows, using

supplemental feeding, and implementing calf management practices.

Monitoring forage conditions and either reducing stocking rates accordingly or feeding are key decisions affecting the financial impact of drought periods (White & Troxel, 1995; Hart & Carpenter, 1999; Hart, 2000). Destocking livestock during periods of reduced forage availability and slowly restocking after forage conditions improve is an economically viable way to control feed costs and operational losses (Carpenter & Hart, 1999). This paper illustrates a case study demonstrating financial implications of selected destocking and restocking strategies to optimize the profitability of South Texas ranching operations in drought conditions.

MATERIALS AND METHODS

The Financial and Risk Management Assistance (FARM Assistance) financial planning model was used to illustrate the individual financial impacts of various management stocking and feeding practices by South Texas ranchers. FARM Assistance, a farm-level stochastic simulation model, is the basis of an outreach program by the Texas A&M AgriLife Extension Service and is a decision support system available to any Texas producer who addresses the decision steps of formulating strategic business alternatives and evaluating their

likely financial impact. FARM Assistance simplifies the evaluation process, increasing the likelihood that farm managers will more accurately evaluate alternative strategies (Klose & Outlaw, 2005). Kaase et al. (2003) described the FARM Assistance process as a unique combination of a state-of-the-art decision support system with an extension risk management specialist working one on one with a producer to provide individualized economic and risk assessment evaluations. Klose and Outlaw (2005) described the technical simulation methodology and the philosophy of providing information to help producers choose among long-term strategic business alternatives. To accomplish that objective, a baseline is created representing the current strategic plan for moving the operation through a 10-year planning horizon. The baseline serves as a benchmark for comparing the long-term financial implications of alternative plans (Kaase et al., 2007). The FARM Assistance stochastic financial forecast methodology served as the basis for analyzing the potential impacts that a producer might expect from common cattle stocking management strategies in South Texas.

The FARM Assistance model was used to develop financial projections for a representative ranch under five distinct management scenarios. Input parameters (cattle prices, feed prices, calving rates, and weaning rates) were modeled as stochastic in the development of a financial performance projection. Prices were assumed to be multivariate empirical using 10 years' worth of the most recent price data. Stochastic production parameters were also modeled as multivariate empirical using 10 years of production history. However, production and price variables were independent of one another, assuming that the production of the individual or even the local region was too small to impact the broader price markets. All other input variables and management choices were deterministic parameters. The stochastic nature of the model provides information with respect to the projected variability associated with the ranch's financial position and performance.

This case study was based on the professional knowledge and input of area management, range, and livestock specialists. Scenarios were chosen to reflect typical options that livestock managers

considered or followed during dry periods in the region. The five possible scenarios included (1) no destocking in year one, (2) destock 50% (calves, cull cows, and replacements in the first three months of year one) and restock 100% by the third year, (3) destock 75% (50% in first three months and 25% more by six months) in the first year and restock 100% by the third year, (4) destock 100% (50% in the first three months, 25% more by six months, and all cattle by nine months) of the first year and restock 100% by the third year, and (5) destock 100% (50% in first three months, 25% more by six months, and all cattle by nine months) of the first year and restock to only 75% by the third year.

The 2,000-acre ranch in this analysis consists of 1,800 acres of native pasture and 200 acres of established coastal Bermuda grass used for grazing. The representative ranch is located in DeWitt County in the north-central portion of South Texas. The cow herd includes 200 cows (1 animal unit to 10 acres) and 8 bulls (1 bull to 25 cows). The general ranch assumptions are given in [Table 1](#). Off-farm income and family living expenses are included in the model to reflect a typical real-world scenario for cattle operations of this size. This essentially impacts each scenario the same but allows for cash to support some expenses instead of assuming that all needed cash would be borrowed. Production inputs, yields, cost, and estimates for overhead charges were based on typical rates for the region. In 2011, the income from hunting was \$10/acre. The assets, debts, machinery inventory, and scheduled equipment replacements for the projection period were also the same in all management scenarios. It is assumed that 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 August 29, 2011. Cows and bulls were depreciated over five years.

Specific hay and protein feeding assumptions were estimated for each scenario ([Table 2](#)). Destocking was reflected by a decrease in feed and maintenance costs calculated monthly and reported as an annual total (see [Table 2](#)). The ranch conducts pregnancy tests on cows and breeding soundness examinations on bulls and has an 85% calving rate. Calf sizes and death loss assumptions in the scenarios were based on research conducted

Table 1. Representative South Texas ranch assumptions

Selected Parameter	Assumptions
Operator off-farm income	\$24,000/year
Spouse off-farm income	\$35,000/year
Family living expense	\$30,000/year
Native pasture	1,800 acres
Improved pasture (Bermuda)	200 acres
Ownership tenure	100%
Royalty income	Not included
Hunting income	\$10/acre
Herbicide (Bermuda only)	\$2.50/acre
Fertilizer (Bermuda only)	\$18.00/acre
Herd size (initial)	200 cows, 8 bulls
Cow herd replacement	Bred cows
Vet, medicine, & supplies	\$25/cow
Salt/mineral blocks	\$26/cow/year
Calving rate	85%
Cow culling rate	7.50%/year
Steer weaning weights	275 pounds; 550 pounds
Heifer weaning weights	250 pounds; 500 pounds
Steer prices (275 wt; 550 wt)	\$1.60/pound; \$1.30/pound
Heifer prices (250 wt; 500 wt)	\$1.40/pound; \$1.20/pound
Cull cow prices	\$.50/pound
Cull bull prices	\$.70/pound
Bred cow prices	\$1,400/head
Replacement bull prices	\$2,500/head
Hay prices (2011, 2012, 2013)	\$150/ton; \$120/ton; \$85/ton
Range cube prices	\$.18/pound
Pregnancy testing	\$6.50/cow
Bull testing	\$57.63/bull

by Texas A&M AgriLife Research and the Texas A&M AgriLife Extension Service.

The first scenario assumes that the ranch does not destock and feeds supplemental hay and range cubes year-round to compensate for depleted forage. Steer and heifer weaning weights were

assumed to be 550 pounds and 500 pounds, respectively. Calf prices in 2011 were \$1.30/pound and \$1.20/pound for the large- and medium-frame steers (muscle score 2) steers and heifers, respectively. Maintaining the herd size required a full feeding regime during 2011–2013 as forage conditions recovered (see Table 2).

In Scenarios 2–5, the use of supplemental hay and range cubes required to sustain the herd are reduced due to destocking (see Table 2). All of these scenarios assumed early weaning of calves (steers 275 pounds and heifers 250 pounds) in 2011. Average prices in 2011 for early weaned calves were \$1.60/pound for steers and \$1.40/pound for heifers. In the years 2012–2020, weaning weights were assumed to be 550 pounds and 500 pounds, respectively. It was assumed that the operation would restock to 100 cows in 2012 and to 200 cows in 2013 in Scenarios 2–4. In Scenario 5, cows were restocked to 75 in 2012 and to 150 in 2013.

The base year for the 10-year analysis of the representative ranch is 2011, and projections are carried through 2020. The projections for commodity and livestock price trends were provided by the University of Missouri's Food and Agricultural Policy Research Institute, with costs adjusted for inflation. 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) includes the purchase/sale of breeding livestock but does not include noncash expenses such as depreciation. Net farm income (NFI), considered a more accurate measure of profitability, includes noncash expenses but does not count the long-term capital purchase/sale of breeding livestock. 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 can be measured by the ending cash balance, which is net of taxes. Each measure provides information with respect to the projected variability in the ranch's financial position and performance. As a whole, the analysis provides insight into the risk and return expectations of the ranch throughout the 10-year planning horizon under each management practice.

Table 2. Representative South Texas ranch feed assumptions (200 cows)

2011 Destocking & 2012–2013 Restocking Scenarios	Feed Type	Amount Fed (Tons/Cow)			
		2011	2012	2013	2014–2020
1. No destocking	Hay	3.650	3.650	3.650	0.910
	Cubes	0.730	0.730	0.730	0.182
2. Destock 50%; restock 100%	Hay	2.280	1.820	1.820	0.910
	Cubes	0.456	0.364	0.364	0.182
3. Destock 75%; restock 100%	Hay	1.823	0.910	0.910	0.910
	Cubes	0.365	0.182	0.182	0.182
4. Destock 100%; restock 100%	Hay	1.593	0.910	0.910	0.910
	Cubes	0.319	0.182	0.182	0.182
5. Destock 100%; restock 75%	Hay	1.593	0.300	0.300	0.300
	Cubes	0.319	0.060	0.060	0.060

Table 3. Financial projections: Selected indicators (200 cows)

2011 Destocking & 2012–2013 Restocking	10-Yr Averages (2011–2020)			Cumulative	
	Total Cash Receipts	Total Cash Costs	Net Cash Farm Income	Ending Cash 2020	Change in Real Net Worth
1. No destocking	\$173,880	\$158,560	\$15,310	\$327,280	12.1%
2. Destock 50%; restock 100%	\$166,770	\$141,250	\$25,520	\$427,440	14.5%
3. Destock 75%; restock 100%	\$169,100	\$140,960	\$28,140	\$455,090	15.3%
4. Destock 100%; restock 100%	\$172,090	\$145,930	\$26,170	\$437,150	14.8%
5. Destock 100%; restock 75%	\$143,190	\$113,120	\$30,070	\$473,290	14.5%

RESULTS

Comprehensive financial projections for each management scenario are illustrated in Table 3. This table represents the average outcomes for NCFI, cash flow, and other selected financial projections during the 10 years (2011–2020). Additionally, Figures 1 and 2 graphically illustrate the range of possible variation in NFI and ending cash balances for the five scenarios.

All evaluated destocking and restocking management practices (Scenarios 2–5) offer the potential to significantly improve bottom-line profits in a drought situation as compared to no destocking (see Table 3).

With no destocking (Scenario 1), the 10-year average NCFI is \$15,310/year. The operation begins the first year of each scenario with a cash

balance of \$10,000 and, if profitable, accumulates cash over the 10-year period. Cumulative cash reserves at the end of the 10-year projections for Scenario 1 are \$327,280. Real net worth for the operation is projected to reach a cumulative 12.1% growth over the 10-year period.

Each of the destocking scenarios represents an improvement in profitability, cash flow, and equity growth relative to no destocking in Scenario 1. NCFI potentially improves from \$10,000 to \$15,000 over Scenario 1. Scenario 5 (destocking 100% but only restocking to 75%) offers the greatest potential for NCFI with a \$30,070 average. In this scenario the supplemental feed cost savings slightly outweigh the loss in production capacity from permanently limiting the herd size to 75% of Scenario 1.

Figure 1 illustrates the NFI for the five scenarios. In 2011 and 2012, the highest profit performance

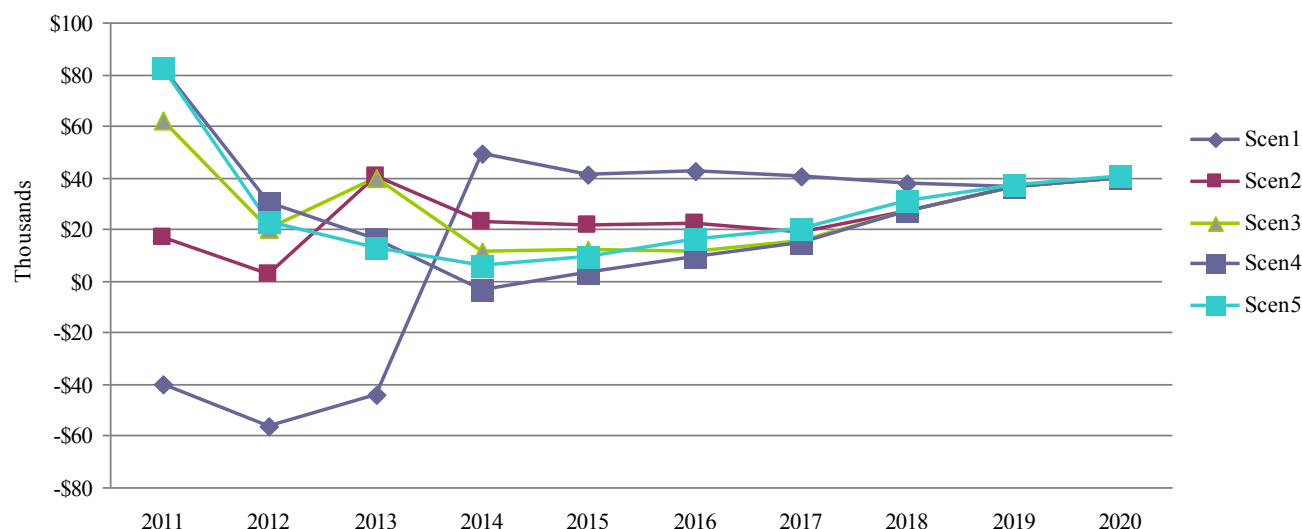


Figure 1. Net farm income for South Texas ranch destocking/stocking scenarios during 2011 drought

comes from scenarios that destock the most and reduce the most feed expense. NFI will also be greater in destocking situations because the sale of breeding livestock will create net income, especially when selling older animals that have been fully depreciated. The order of NCFI performance changes in 2014 when the model is well into the recovery period. By this time, Scenario 1 produces the highest profit. Most of the difference in 2014–2018 has to do with depreciation. During the recovery period, scenarios that are restocking cows will experience greater noncash expense of depreciation from newly purchased cows, lowering NFI. In addition, the annual culling of cows will produce more net income for scenarios that do not cull livestock through the drought because the culled animals will have little depreciable basis remaining. The NFI profit measure converges for all five scenarios, as this depreciation difference is diminished over six to seven years of culling/replacing the herd.

Scenario 5 projects the highest average ending cash balance with \$473,290. A significant portion of the additional cash on hand is a result of not purchasing 50 cows compared to the other four scenarios. While Scenario 5 carries a greater cash asset balance, the other scenarios carry more assets in cattle inventory. The critical result, however, is that each of the destocking scenarios has a better cash flow in comparison to maintaining the herd size and feeding through the drought. Figure

2 illustrates the pattern of annual cash flow for each scenario. Clearly from this picture, Scenario 1 would have the most troublesome cash flow situation, with a negative cash position through the first three years that prevents Scenario 1 from ever matching the performance of the destocking scenarios.

While Scenario 5 has the highest cash flow and average profit, Scenario 3 produces the greater real net worth by the end of the 10-year projection period. The asset value of a larger herd helps increase the equity in Scenario 3 to a 15.3% growth. The other destocking scenarios experience slightly less growth but still significantly more than no destocking.

CONCLUSIONS

The financial performance and condition of a typical South Texas cow-calf operation are normally supported by some off-farm income, hunting, and other sources of income. However, stocking strategies in a drought can have a significant impact on near-term and long-term profitability and performance. Destocking, compared to maintenance feeding during a prolonged drought, offers cow-calf producers the potential to minimize losses.

While the financial projections presented slightly favor Scenarios 3 and 5, a lighter stocking rate (Scenario 5) would put the ranch in a

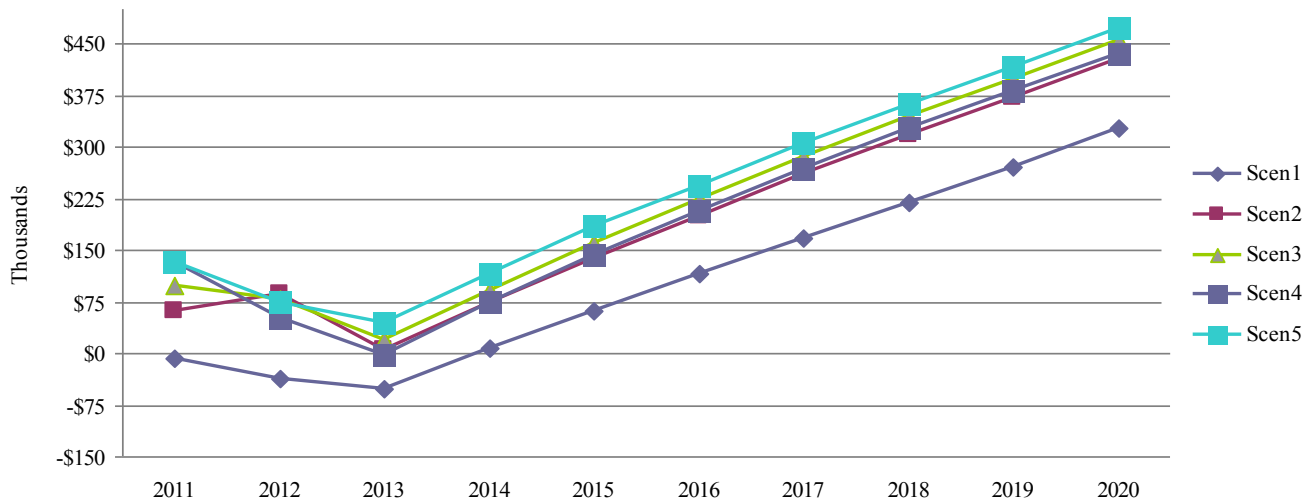


Figure 2. Ending cash balance for South Texas ranch destocking/stocking scenarios during 2011 drought

better position to withstand the effects of future drought and limited forage conditions that were not included in the analysis. Restocking the ranch and maintaining herd size at a lower stocking rate (Scenario 5) may stretch forage availability further throughout the year. In addition, it will improve overall profitability by reducing long-term feed and cattle purchasing costs.

The actual amount and timeliness of destocking is directly linked to the severity of the drought and the availability of forage. Nevertheless, this analysis clearly indicates that destocking and controlling feed costs is typically a better management decision than paying the added cost of feeding. While the NCFI of the four destocking options may not be significantly different, each is a superior choice compared to feeding the whole herd throughout the drought.

Actual results will vary by producer, management practices, and cattle markets, but this example ranch is provided to show the bottom-line impacts for a reasonable set of assumptions. Analyzing different scenarios affords producers the opportunity to make educated decisions when destocking or restocking is often clouded by many variables. Weather is difficult to predict, but this study materializes the understanding that prolonged feeding during a dry year can drastically affect profitability and that decisions to destock should be made early and often. Additionally, maximizing stocking rates may not equate to higher

profits due to the costs involved in purchasing and maintaining cattle and the risk of poor weather and therefore forage conditions. A judicious manager will plan ahead to implement the best stocking strategy during drought to improve the overall financial performance of the ranch and minimize overall risk.

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