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Predicted Financial Performance of Three Beef Cow Calving Seasons in South Texas

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ABSTRACT

Future financial performance was predicted for cow herds in dual, spring, and fall calving season regimens using a system dynamic model parameterized with historic production and financial data from King Ranch and future cattle prices estimated by CattleFax. Results are reported on a 1,000 cows/herd basis for predicted average annual pretax accrual adjusted net income, predicted average annual cost-based investment in breeding livestock, and predicted average annual return on investment on cost-based breeding livestock. The predicted results of the simulations indicated that over the next 10 yr, the fall calving season would generate more net income than either the dual or spring calving season on the King Ranch. However, a dual calving season would have less invested in breeding livestock and a greater return on breeding livestock than either the spring or fall calving seasons. Based on market risk, variation in precipitation, investment in breeding livestock, and return on breeding livestock, having a dual calving season is predicted to be a superior management strategy compared with spring- or fall-only calving seasons for the King Ranch from 2007 to 2016.

Key words: financial performance, calving season, beef cow, South Texas

INTRODUCTION

Cow-calf production in South Texas is challenging for many reasons, including environmental factors such as temperature and precipitation, but it also provides unique opportunities. Although variable, forage availability and quality can be adequate for cow-calf production year round because winters are mild. Because of these factors, cattle operations can choose to calve cows during both the spring and fall season.

Some potential benefits of using a dual calving (**DC**) season are that cattle operations may be able to take advantage of seasonal highs in the cattle market and spread their marketing opportunities out throughout the year (Selk, 2002). Perceived advantages also include giving nonpregnant cows a second chance to become pregnant, and requiring fewer breeding bulls because they can be used in both the fall and spring breeding season, which decreases the amount invested in breeding livestock. In addition, having herds that calve in 2 separate seasons may be a risk management strategy for drought, because only half the cows are in any stage of production at any given time.

Even though a DC season may have some potential benefits, few studies have compared the profitability of a DC season with the more commonly used single calving season. Tronstad and Gum (1994) used a stochastic dynamic model to develop range cow culling strategies, and their results showed that the traditional strategy of spring calving (**SC**) and culling all open cows was economically inferior to DC and strategic culling. However, a study conducted by Doren et al. (1985) showed that, numerically, the 3 most profitable alternatives of the 16 calving season scenarios they reported on were associated with SC herds.

The King Ranch is an example of a cow-calf operation in South Texas that uses a DC season, with approximately one-half the cows calving from February 1 to April 15 and one-half the cows calving from September 15 to December 1 of the same year. It is unknown whether this is the most profitable calving season system for their operation. The objective of this study was to compare the predicted profitability of DC, SC, and fall calving (**FC**) seasons for the King Ranch from 2007 to 2016.

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MATERIALS AND METHODS

Prediction Models

A commercially available system dynamic program (Stella 9.0, Isee Systems Inc., Lebanon, NH) was used to model DC, SC, and FC. The 3 models were designed to provide an estimate of average annual pretax accrual adjusted net income (**NI**), average annual cost-based investment in breeding livestock (**IBL**), and average annual return on investment on cost-based breeding livestock (**RBL**) for 2007 to 2016. Financial calculations were done in accordance with Farm Financial Standards Council (1997) recommendations.

Models were parameterized by using historic production data and financial information collected from King Ranch and cattle price projections provided by CattleFax. Production and nominal financial data were collected from the SC and FC herds for 2000 to 2006. Pasture was chosen as the experimental unit. The production data used consisted of average calf weaning weight per pasture (n = 931), rollover rate per pasture (n = 479), and pregnancy rate per pasture (n = 481), and it was assumed that 90% of the pregnant cows would wean a calf. Specific criteria were used to determine whether a nonpregnant cow was a candidate to be rolled over. The financial data collected consisted of the average calf production cost and the average heifer development cost. CattleFax provided nominal calf and utility cow price projections for 2007 to 2016, and predicted prices were dependent on the year and season in which calves and utility cows were sold.

The SC and FC models were based on 1,000-cow herds. The DC was based on 500 SC cows and 500 FC cows. Production data were applied to the models in the following manner. If analysis showed there was a statistical difference between SC and FC season herds for a production variable, then the least squares means (**LSM**) and a weighted SD (**WSD**) for the SC herd production variable were used in the SC model and in one-half of the DC model, and the LSM and WSD for the FC season herds were used in the FC model and in one-half of the DC model. If there was not a statistical difference or if the treatment × year interaction was significant, then the overall LSM and WSD were applied to the SC, FC, and DC models.

The average calf production cost and development cost for the single calving season herds from 2000 to 2006 were applied to the SC model, and the average calf production cost and development cost for the FC season from the same period were applied to the FC model. The DC model was parameterized with both. The predicted calf and cull breeding livestock prices were applied according to year and season of sale for all 3 models. Weaned calves and cull breeding livestock in the SC model and in the SC within the DC model were sold in October, and calves and cull breeding livestock in the FC model and in the FC within the DC model were sold in May.

Analysis

One hundred simulations were conducted for the SC, FC, and DC models for the 10-yr period from 2007 to 2016. The financial outputs for NI, IBL, and RBL were statistically analyzed by using ANOVA, the Single Factor command in Excel (Microsoft Corp., Redmond, WA). If a difference was detected, then contrast analyses using the *t*-test command in Excel were conducted to determine which treatments were different. Results were considered significant at a level of $P \leq 0.05$.

RESULTS AND DISCUSSION

Variation in the financial performance for the 3 calving season model outputs resulted from the randomization of production parameters as affected by the annual precipitation pattern on corresponding cow-calf production data.

Pretax NI

Predicted outputs for financial variables are listed in Table 1. The annual averages from 100 ten-year simulations for each of the DC, SC, and FC were analyzed. The FC NI of $98,381 was predicted to be greater ($P < 0.05$) than both the $94,976 and $56,818 NI generated by the DC and SC, respectively. The DC was predicted to have greater ($P < 0.05$) NI than the SC.

Even though the model indicated that DC would have greater annual calf revenues and lower annual calf production costs, the FC would generate more NI. This was predicted because the FC would have greater capital gains from the sale of cull animals. Additional risk was predicted with both of the single calving seasons, as indicated by more variation around the mean (Table 1). Because the models were parameterized by using data that contained 2 years of drought, they periodically simulated drought conditions. In the single calving season herds, a drought was predicted to affect the performance of the herds over an entire production year. In the DC, a drought was predicted to affect the performance of only one of the seasonal calving herds. As a result, drought created a larger amount of variation in NI over the 100 simulations for both the SC and FC when compared with the DC. Although the FC had the potential of providing a greater NI in some years, it also had the potential of generating less NI in other years.

IBL per Year

The amounts of IBL predicted by the models were a function of the age structure, which was reflected in the depreciation expense of the herd and the cost of developing an animal to mature breeding livestock (Table 1). The simulation model predicted that over the next 10 yr, the SC would have the greatest ($P < 0.05$) amount in IBL, at $595,083, when compared with both the FC, at $549,668, and the DC, at $480,634. The FC would