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Abstract
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Keywords
Cattlemen's Day, 2002; Kansas Agricultural Experiment Station contribution; no. 02-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 890; Beef; Cow-Calf; Efficiency; Profitability; SPA

EFFICIENCY DIFFERENCES IN KANSAS BEEF COW-CALF PRODUCTION

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Summary

For the beef industry to be economically competitive with other meat industries, it is essential that individual producers strive for the most efficient, highest quality, least cost production possible. A sample of 26 Kansas beef cow-calf enterprises from the Kansas Standardized Performance Analysis database (SPA) was used to measure efficiency differences among producers, as well as factors contributing toward these differences. On average, farms were 86% technical, 69% economic, and 58% overall efficient. Thus, our results suggest that output could be increased by 14% with optimal technology use, and cost could be decreased by 42% if farms were fully economically efficient.

(Key Words: Cow-Calf, Efficiency, Profitability, SPA.)

Introduction

While there are many aspects of cow-calf production that are beyond the control of the manager, such as weather, death loss, prices, and some aspects of performance, cost of production is one area in which the manager has substantially more control. In order for a producer to increase their competitive position relative to others in the industry, it is critical that operators be aware of their own production costs. With this information, differences between farms that are efficient, and those that are not efficient can be evaluated for changes that might be advantageous for an individual operation. The use of a detailed enterprise analysis, such as SPA, can be useful for producers to evaluate their production and financial position. The following analysis determines characteristics that distinguish relatively efficient producers from those who are less efficient, while investigating the dependence of efficiency measures on various production and financial management factors.

Experimental Procedures

Twenty-six observations from the KS SPA database, representing 13 Kansas counties and production years 1997-2000 were used for this analysis. Herd sizes in the database ranged from 39 to 300 head, with an average of 158. The average farm in the sample derived approximately 50% of total farm income from cow-calf operations.

Detailed records of inputs, outputs, and cost of production were needed for efficiency analysis. Output was measured as the pounds of calf weaned from exposed females. The four inputs examined were feed, grazing, veterinary, and other. Use of management and labor was not examined in this study due to the lack of a consistent assessment of these factors. Grazing cost included all cost attributed to grazing, such as pasture rent (or opportunity cost of owned pasture), fertilizer, and spray for pastures. Feed cost represented all feed cost other than pasture, such as minerals, grain, harvested forages, and supplements. Veterinary cost included all expenses associated with the welfare of the animal other than nutritional inputs, and

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included items such as veterinary services and pharmaceuticals. The other cost category included all costs not included in the first three expense groups, such as interest, depreciation, and miscellaneous costs.

A series of mathematical programs was used to determine the technical, allocative, economic, scale, and overall efficiencies of operations. Technical efficiency measures how well the operation utilized cutting-edge technology in their production process. Allocative efficiency determines how well the farm purchased inputs; at the best price and in the right proportions. Economic efficiency is computed by multiplying technical efficiency by allocative efficiency. Scale efficiency measures whether the farm produced at the optimal size of operation. Overall efficiency is computed by multiplying economic efficiency by scale efficiency. Overall inefficiency is a result of either sub-optimal use of technology and inputs in the production process, or scale inefficiency. Farms with the lowest per unit cost of production are overall efficient. Efficiency measures for each individual producer were computed on a relative scale of 0 to 100%.

Correlations were calculated between overall efficiency, and production and economic variables. In addition, characteristics that differed between the top and bottom overall efficient groups of producers were revealed through t-tests. A simple regression was also estimated to determine the actual effect of cost on overall efficiency.

Results and Discussion

Table 1 presents the statistical summary of cost, gross revenue, and other important operation characteristics for most and least efficient producers. Forty-six percent of farms were technically efficient. The average technical efficiency rating was 96% for the top half of producers and 76% for the bottom half. Approximately one quarter of the farms had allocative and economic efficiency ratings greater than 90%, while half had scale efficiency ratings greater than 90%. Only 3 out of the 26 farms had overall efficiency ratings greater than 90%. Figure 1 presents efficiency results measuring output (lb) and corresponding cost per unit of output ($/lb). The farm that was overall most efficient (both economic and scale efficient) in the analysis had a production cost of $0.5542/lb and 75,174 lb of production and is located at the minimum cost point on the graph (signified with arrow). Farms that have higher cost and fall on either side of the overall efficient farm in Figure 1 were either not using optimal technologies in production, not allocating their inputs efficiently, or were not producing at the optimal size (75,174 lb). The wide range of efficiency results demonstrates the potential for improvement that exists in cow-calf production.

Simple regression analysis resulted in a significant relationship between total cost and overall efficiency, with each 1% increase in total cost per pound produced decreasing overall efficiency by 0.98%. Regression results suggested that 70.6% of the variability in overall efficiency is explained by changes in total cost ($/lb).

Further results found gross revenue ($/lb) was negatively related to overall efficiency, indicated by the top efficiency group having lower gross revenue ($/lb) than bottom efficiency producers. This result suggests that to increase profitability one should try to cut cost rather than to increase gross revenue per pound. Total, grazing, veterinary, and other cost all were higher for the less efficient producers; however, other cost had the strongest negative association with overall efficiency. This suggests that controlling economic cost such as interest, depreciation, and herd replacement cost, is the key to efficiency.

Other factors that differed between top and bottom overall efficient producers included weaning weights of steers and heifers, and pounds weaned per exposed female,

which were all higher for the top efficiency group. This result emphasizes the importance of production more than many previous studies, but indicates that top producers are achieving efficient weight gains at low cost each year. It should be noted, however, that rainfall amounts were lower for the bottom efficiency group, suggesting that some inefficiency might have been due to resulting forage shortages.

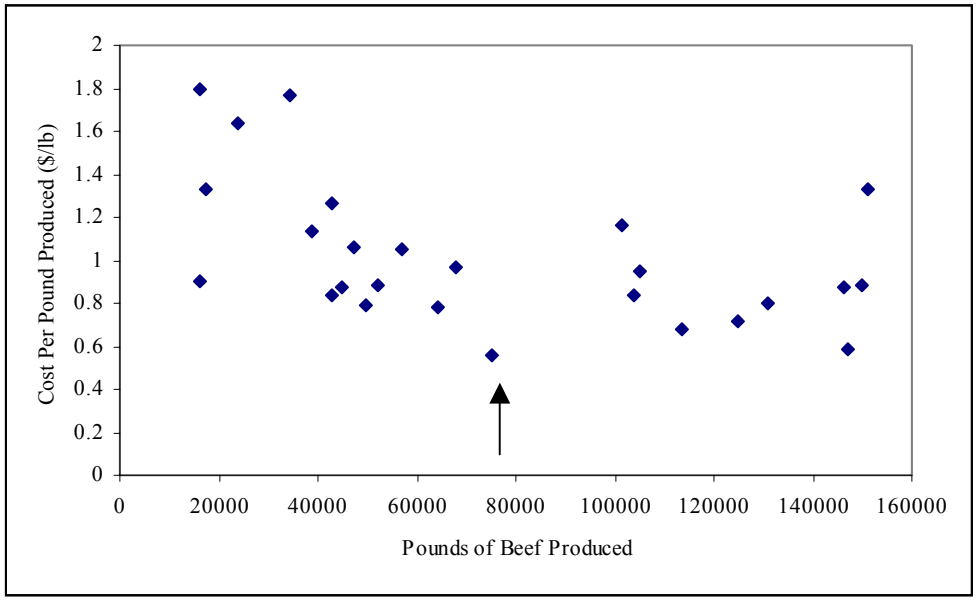

Figure 1. Kansas Beef Cow-Calf Average Cost of Production.

Table 1. Top and Bottom Efficient Producer Results

Variables	Bottom 1/2 Mean	Top 1/2 Mean	P Value	Correlation Coefficient
Technical efficiency	0.76	0.96	0.0016	0.61*
Allocative efficiency	0.76	0.85	0.1268	0.57*
Economic efficiency	0.57	0.81	0.0014	0.80*
Scale efficiency	0.76	0.91	0.0085	0.53*
Overall efficiency	0.42	0.74	0.0000	1.00*
Real gross revenue ($/lb)	1.13	0.83	0.0019	-0.64*
January 1 inventory (hd)	155	160	0.8751	0.30
% Revenue from cow-calf	62.77%	45.85%	0.1353	-0.13
Total cost ($/lb)	1.23	0.80	0.0003	-0.78*
Feed cost ($/lb)	0.30	0.27	0.5253	-0.24
Grazing cost ($/lb)	0.32	0.24	0.0441	-0.34
Veterinary cost ($/lb)	0.08	0.05	0.1661	-0.41*
Other cost ($/lb)	0.53	0.24	0.0001	-0.81*
Net base transfer cost ($/lb)	-0.01	0.03	0.2692	0.36
Total cost ($/cow)	482.67	406.97	0.0452	-0.49*
Feed cost ($/cow)	108.86	137.83	0.3888	0.11
Grazing cost ($/cow)	140.51	126.70	0.6516	0.06
Vet cost ($/cow)	29.73	25.37	0.6462	-0.21
Other cost ($/cow)	203.58	113.20	0.0023	-0.70*
Average weaning weight (lb)	481.46	561.92	0.0122	0.57*
lb weaned /exposed female (lb)	421.62	497.92	0.0087	0.53*
lb calf weaned (lb)	67366	83705	0.3737	0.43*
Rainfall (in)	20.88	29.62	0.0050	0.44*