DIFFERENCES IN EFFICIENCY AMONG KANSAS BEEF COW PRODUCERS

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Summary

Beef cow producers must manage costs of production and improve production efficiency to compete with hog and poultry and other beef cattle producers. A sample of 46 beef cow enterprises from the Kansas Farm Management database was used to measure technical, economic, and overall efficiencies. On average the farms were 92% technically efficient, 80% economically efficient, and 73% overall efficient. Our results suggest that 5% increases in economic and scale efficiencies would increase profit per cow by $20 and $24, respectively.

(Key Words: Cows, Efficiency, Profitability.)

Introduction

The hog and poultry industries have increased their production efficiencies through economies of size and the adoption of new technologies. These changes have increased the competitive pressure on the beef cattle industry.

For beef cattle producers to remain competitive with hog and poultry producers, they must continue to improve production efficiency and manage costs of production. High-cost producers need to evaluate their management practices and search for more efficient ways to produce a pound of beef. Inefficient producers will lose money and be forced to exit the industry because they are not cost competitive. The objective of this study was to evaluate the efficiencies of a sample of Kansas cow-calf producers and to determine the impact inefficiencies have on profitability.

Experimental Procedures

The data used in this study were from the Kansas Farm Management Association database. The 46 operations we studied had continuous data from 1992 to 1996. Four regions of Kansas were represented; southeast (27 farms), northcentral (11 farms), northeast (5 farms), and northwest (3 farms).

The efficiency analysis required data on costs of production, inputs, and outputs. Output was measured as total pounds of beef produced, which included weaned calves and culled breeding stock. Input costs included labor, feed, capital, fuel and utilities, veterinary expenditures, and miscellaneous. Labor costs included both hired and unpaid operator labor. Feed costs included pasture costs as well as raised and purchased feeds. Capital costs included interest, repairs, depreciation, machinery hired, and opportunity costs associated with owned assets. All input costs were converted to real 1996 dollars, and all the figures were averaged for each operation over the 5-year period.

Table 1 presents the statistical summary for gross revenue, profits, costs, and other relevant characteristics of the operations. On

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average, the producers lost $95.77 per cow during the 5 years. Net return per cow ranged from -$388 to $48. About 39% of the operations had an average return per cow that was less than -$100. Another 54% had an average return per cow that was between -$100 and $0. The remaining operations (7%) had an average return per cow that was above break-even. Feed was the most costly input of all 46 farms, accounting for about 48% of the total cost. Capital comprised about 26% and labor costs about 46% of the total costs. The average herd size was about 114 cows, and nearly 561 pounds of beef were produced per cow from weaned calves and culled breeding stock.

A series of mathematical programs was used to determine the technical, economic, and overall efficiencies. Technical efficiency measures whether or not the producer uses the most up-to-date technologies. A technically inefficient farm does not produce as much as other farms with the same inputs. Economic efficiency measures how well the producer minimizes costs for a given level of output. Economic inefficiency can be attributed to technical inefficiency or allocative inefficiency (failure to utilize the optimal input mix). Scale efficiency measures whether a firm is producing at the optimal size. Overall efficiency (the product of technical, allocative, and scale efficiencies) determines the minimum cost of producing a given output level under constant returns to scale technology. Overall inefficiency can be attributed to economic inefficiency or not producing at the most efficient size.

Regression analysis was used to determine the relationship between economic and scale efficiencies and profit per cow. Specifically, the impact on profit per cow of 5% increases in economic and scale efficiencies was evaluated.

Results and Discussion

Table 2 reports the statistical summary for the efficiency measures. Technical efficiency ranged from 0.58 to 1.00. Approximately 42% of the operations in the sample were technically efficient (technical efficiency measure = 1.00). On average, technical efficiency was 0.92, indicating that output could be increased by 8%, if all the farms in the study possessed a technical efficiency measure of 1.00.

The average economic efficiency measure for the sample was 0.80. If all of the farms in the study were economically efficient, the same level of output could have been produced with 20% less cost . About 15% of the farms were economically efficient.

Average scale efficiency (not shown in Table 2) was 0.93. If all farms had been producing at the scale-efficient size (120 cows), cost could have been reduced by 7%. Scale-efficient size is the farm size that produces with the lowest average cost; this farm also possesses a scale efficiency measure of 1.0. Over 70% of the farms had scale efficiency indices over 0.90, indicating that scale inefficiency was a minor problem.

Overall efficiency ranged from 0.50 to 1.00 and averaged 0.73. The same level of output could have been produced using 27% less cost, if all farms had been economically and scale efficient. Only one farm in the sample was overall efficient.

Regression analysis indicated significant relationships between profit per cow and economic and scale efficiencies. Based on that analysis, a 5% increase in economic efficiency would result in a $20 increase in profit per cow. A 5% increase in scale efficiency would increase profit per cow by $24. Given the average levels of economic and scale efficiencies in this study, significant room for improvement exists.

Because average economic efficiency was lower than average scale efficiency, inefficient farms should focus on input cost control before changing operation size.

Table 1. Summary Statistics for a Sample of Kansas Beef Cow Farms (1992-1996)

Variables	Unit	Mean	Standard Deviation
Gross revenue per cow	$	404.04	49.53
Labor expense per cow	$	80.28	28.44
Feed expense per cow	$	241.93	28.31
Capital expense per cow	$	128.80	27.24
Fuel expense per cow	$	19.60	10.28
Veterinary expense per cow	$	15.01	9.18
Miscellaneous expense per cow	$	14.23	8.46
Profit per cow	$	–95.77	79.89
Age of operator	yrs.	53.76	10.55
Beef produced per cow	lb.	560.76	52.85
Herd size	no.	114.44	78.89
Gross farm income	$	133,872	130,672
Percent of income from beef	%	45.65	27.16

Source: Kansas Farm Management Association.

Table 2. Efficiency Measures for a Sample of Kansas Beef Cow Farms (1992-1996)

Variable	Technical Efficiency	Economic Efficiency	Overall Efficiency
Summary statistics (index)			
Mean	.92	.80	.73
Standard deviation	.11	.13	.12
Minimum	.58	.54	.50
Maximum	1.00	1.00	1.00
Efficiency	))))))) Percentage of farms)))))))		
0 to .50	0.0	0.0	2.2
.51 to .60	2.2	8.7	10.8
.61 to .70	6.5	17.4	26.1
.71 to .80	8.7	26.1	26.1
.81 to .90	15.2	23.9	26.1
.91 to .99	26.1	8.7	6.5
1.00	41.3	15.2	2.2

Source: Kansas Farm Management Association.