

Efficiency of Louisiana Beef Cattle Producers

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Findings

- Older, more highly educated beef cattle producers who worked in an off-farm job were more efficient than younger, less educated, full-time beef cattle producers.
- Producers who used purebred *Bos taurus* bulls, mixed-breed Brahman cows, and who used improved pasture were the more efficient producers.

Introduction

Beef cattle producers use a wide range of production practices because climate and landscapes under which cattle are produced vary greatly. In addition to variation in production conditions, cloudy price signals provide little guidance as to the type of animal most desired by packers. With the resulting wide array of practices used to produce cattle, it is likely that some common production practices lead to inefficient operations. Determination as to the types of practices that lead to efficiency is especially important in an industry where margins are likely to be low and, at times, nonexistent. This leads to the question: which producers are likely to be financially successful in the beef industry? The objectives of this study are to (1) estimate the technical efficiency (production efficiency) of a selected group of beef cattle producers and (2) determine the characteristics of cattle operations that are the most technically efficient.

Experimental Approach

Sixty-two Louisiana beef producers in 12 parishes were surveyed to determine their input usage and the amount of output they produced in 1998. To obtain a representative group, parishes were chosen based upon number of cattle and location in the state. County agents in the 12 parishes had been previously contacted and requested to assemble groups of five to 10 producers who kept good records. Most meetings were held at parish extension offices. Detailed production information was collected to use in developing costs and returns information for beef cattle operations. Information collected included, but

was not limited to, land use, breeding and management strategies, labor, feed, forage management, and others.

The modeling procedure used to estimate the technical efficiency of cattle operations was data envelopment analysis. This type of analysis uses linear programming to calculate technical efficiency. Technical efficiency measures output (calves and stockers) over input (hay, machinery usage, etc.). The higher the measure, the better, since one strives to get the most output that can be obtained for a given level of input. Suppose Producer 1's technical efficiency is calculated to be higher than Producer 2's. This indicates that, given the two producers used the same levels of inputs, Producer 1 was able to produce more than Producer 2. Producers with the highest level of technical efficiency have technical efficiency levels of 1. The lowest level of technical efficiency is 0; this would occur if the producer used inputs but produced nothing. Other producers' technical efficiency scores fall between 0 and 1.

Outputs used in measuring technical efficiency included the numbers of weaned calves and stockers produced. Inputs used in the measure of technical efficiency included the number of cows, the number of acres in the cattle operation, the number of breeding bulls, the total hours of labor used per year in the cattle operation, the amount of hay fed to cattle per year, and the total cost of operating tractors and machinery.

With technical efficiency measures estimated for each of the surveyed producers, follow-up analysis determined the types of producers who were the most technically efficient. Tobit analysis was used to achieve this end. Fourteen different descriptors of farmers and their production practices were used in this analysis. These descriptors fit into four categories: general production practices, breeding practices, demographic characteristics of the producer, and farm characteristics. General production practices examined in the analysis included: (1) whether the producer raised stockers, (2) the weaning weight of the calves sold in 1998, and (3) the percentage of the producer's pasture that was "improved." In this case, "improved" refers to whether the producer fertilized the pasture and clipped it on an as-needed basis.



Breeding practices examined included: (1) whether purebred *Bos taurus* bulls were used in the operation, (2) whether registered cows were used in the operation, (3) whether mixed-bred Brahman cows were used in the operation, and (4) whether the producer pregnancy tested cows.

Demographic characteristics of the producer included in the analysis were (1) the producer's age, (2) the producer's education, (3) the number of hours per week that the producer worked in an off-farm job, and (4) whether the producer rated the cattle operation as "highly important" (versus rating it at a lower level, such as of medium or of less importance). Farm characteristics examined in the model included: (1) the percentage of land used for the cattle operation that was rented, (2) the total number of acres on the farm, and (3) whether the farm was located in South Louisiana, which included the two parishes, Calcasieu and Lafourche.

Results and Discussion

The results of the Tobit analysis are presented in Table 1. Results indicate that the following factors are associated with technical efficiency: Purebred *Bos taurus* Bull, Mixed-Brahman Cows, Registered Cows, Age, Education, Time Worked in an Off-Farm Job, Importance of the Operation, Whether the farm is in South Louisiana, and the Percentage of Improved Pasture. The "Significance Level" indicates whether the factor was found to significantly influence technical efficiency. The "Direction" indicates how the factor affected technical efficiency. A positive direction indicates that the variable is positively associated with technical efficiency. In the case where the variable was not found to be significant, there is not enough evidence provided in this analysis to suggest that a relationship exists between the variable and technical efficiency. This does not mean that a relationship does not exist, but, for this relatively small group of producers, there was not enough statistical evidence to support the conclusion that a relationship exists.

Results suggest that use of purebred *Bos taurus* bulls, rather than *Bos indicus* or *Bos indicus* crossbred bulls, leads to higher technical efficiency, supporting the previous work of animal scientists. Results also suggest that an increase in the percentage of mixed-bred Brahman cows in the herd is correlated with an increase in technical efficiency, also consistent with previous studies. Farmers who raised registered cows were more technically efficient. The incentive of producers to more closely manage their operations, the use of high quality breeding stock, and the use of high quality inputs likely explains the greater techni-

cal efficiency of registered producers. This is not meant to imply that all producers should use registered cows, only that many of those who do are likely working in a different economic environment that leads to improved technical efficiency. Producers who used a higher percentage of improved pasture were more technically efficient than those who used less improved pasture. This suggests increased overall productivity associated with the improvements.

There was a high correlation between age and technical efficiency. The older the producer, the higher the technical efficiency. This positive relationship is consistent with the argument that experience is a dominant factor in determining technical efficiency. Higher educated farmers also were more technically efficient. Though formal education received by a farmer may not be directly related to agriculture, it improves the ability to understand new developments in the industry and the ability to adopt more efficient managerial practices.

The amount of time the producer worked in an off-farm job was positively related with technical efficiency. This was, at first, surprising. It is consistent, however, with the argument that producers with an off-farm job must compensate for the time they spend off-farm, making more efficient use of their own management and labor. Therefore, they become better managers and more efficient in their use of resources. Producers who rated their cattle operations as highly important were more technically efficient than those who did not. This factor indicates that the producer's attitude toward the operation is positively related to efficiency.

Several variables were not found to be significant: the presence of stockers, weaning weight of calves, whether the producer pregnancy tests, the percentage of land rented, and total farm acreage. The insignificance of these variables does not lead to the conclusion that they do not affect technical efficiency. It simply suggests there is not enough evidence from the small group of producers examined to suggest with confidence that they do affect technical efficiency.

Overall, results of this study of cattle farms support a number of recommendations made by scientists, notably the superiority of using *Bos taurus* bulls and mixed-bred Brahman cows and the benefits of using improved pasture. Results also show the relationship of age, education, attitude, and employment characteristics on technical efficiency.



Table 1. Results of the Tobit analysis on technical efficiency of Louisiana beef cattle farms.

Variable	Significance level ^a	Direction ^b
General Production Practices		
The Producer Raises Stockers for Sale	NS	
Weaning Weight of Calves	NS	
Percentage of Improved Pasture	HS	Positive
Breeding Practices		
Producer Uses Purebred <i>Bos taurus</i> Bull	VS	Positive
Producer Uses Registered Cows	VS	Positive
Producer Uses Mixed-bred Brahman Cows	HS	Positive
Producer Pregnancy Tests Cows	NS	
Demographic Characteristics of Producers		
Producer's Age	HS	Positive
Producer's Years of Formal Education	VS	Positive
Number of Hours per Week the Producer Works In an Off-farm Job	S	Positive
The Operation is Rated as Highly Important to the Producer	S	Positive
Farm Characteristics		
Proportion of Land Used for Cattle that Is Rented	NS	
Total Farm Acreage	NS	
The Farm Is Located in South Louisiana	S	Positive

^a HS indicates the variable is highly significant ($P < .01$). VS indicates the variable is very significant ($P < .05$). S indicates the variable is significant ($P < .10$). NS indicates the variable was not found to be significant.

^b Direction was not specified for the non-significant variables.