# COW-CALF PRODUCERS' PERCEIVED PROFIT MAXIMIZATION OBJECTIVE: A LOGIT ANALYSIS

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## Abstract

A logistic regression (logit) model was developed to examine how socioeconomic characteristics of cow-calf producers influenced their perceptions of themselves as profit maximizers. Amount of pasture acreage, percent of income earned from the cow-calf operation, and desire to increase net worth and efficiently use labor significantly increased the producer's probability of claiming to be in the business primarily to maximize profits. Some sociological reasons for owning cattle significantly reduced the probability of the producer claiming to be a profit maximizer while others significantly increased the probability.

*Key words:* logit analysis, cow-calf, producer objectives.

**H**uman behavior is goal oriented (Kluckholm). An individual's goals are objectives not yet reached that provide direction to human motivation and influence behavioral characteristics. The behavioral theory of the firm shows how changes in the internal characteristics of the firm, resulting from changes in the relative importance of various goals, cause a firm to respond differently to the same conditions at different times (Patrick and Eisgruber).

Agricultural economists have long questioned whether farmers and ranchers follow the behavioral assumptions of the profit-maximizing hypothesis as put forth in the neoclassical theory of the firm. Several studies have shown that other economic and social factors are important to farmers. Smith and Martin found that family fundamentalism, conspicuous consumption, and resource protection significantly affected the price of Arizona ranches. Molnar observed that the main reason cited by Alabama farmers for staying in farming was to be one's own boss. Harper and Eastman evaluated both family and economic goals of farmers in New Mexico and found that in a hierarchical setting, quality of life was ranked as the most important goal followed by maximizing income. Lin et al. found that a Bernoullian utility maximization model explained actual farm behavior more accurately than profit maximization.

The profit-maximizing hypothesis has been particularly suspect in the cow-calf industry. Very low industry-average pre-tax rates of return to cow-calf producers have been evident over long periods of time during which cattle numbers increased dramatically (Boykin et al.; Gilliam). Yet, in a recent survey of Texas cow-calf producers who also produced at least one other agricultural commodity, nearly 90 percent of the respondents stated that their primary objective for being in the cow-calf business was to maximize profits (Young and Shumway).

This finding does not preclude the possibility that Texas cow-calf producers are motivated by a multiplicity of goals or that Texas producers perceive a consumptive value of owning cattle by way of conspicuous production as Musser et al. found in Georgia. It is, nevertheless, striking that such a large portion of the respondents placed the profit-maximizing goal in such a central position by claiming it as their "primary" motivation. The objective of this study is to examine the related survey evidence in an effort to identify relationships between the structural and socioeconomic characteristics of cow-calf producers and the probability that they state they are in the cow-calf business to maximize profits.

Specific hypotheses to be examined include:

1. The structural characteristics of number of cows, the percent of income earned from the cow-calf operation, the production of another agricultural commodity for cash sale, pasture acreage, and leasing land for hunting are positively related to the probability that the producer states that he/she is in the cow-calf business primarily to maximize profits.

2. The structural characteristics of number of years in the cow-calf business and employment off the farm or retirement are negatively related to the probability that the producer is in the cow-calf business primarily to maximize profits.

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3. Stating that other economic motivations for owning cattle are important is positively related to the probability of the producer's stating that profit maximization is the primary motivation for being in the cow-calf business.

4. Stating that social motivations for owning cattle are important is negatively related to the probability of the producer's stating that profit maximization is the primary motivation for being in the cow-calf business.

The first and second hypotheses are based on the notion that profit-oriented producers are currently more involved in the farming and ranching activity, that they utilize resources in multiple agricultural activities, and that they capitalize effectively on the economies of size evident in the cow-calf industry (Gilliam). Management of wildlife by leasing land for hunting often improves income for all types of pasture conditions (poor to excellent) by controlling the deer population that competes with cattle for a portion of the same forage base (Glover and Conner). Producers motivated primarily by profit maximization could be more likely to participate in hunting lease practices not only because of the income generated by the lease but also because of the greater income from livestock production by controlling deer populations.

Secondly, it is hypothesized that for producers who have stayed in the cow-calf business through years of low returns, profits may not be a primary motivation. A person with more years of experience in farming or ranching may be more likely to have built up some equity and to have a good credit record and financial stability than a recent entrant to the business (Ladewig). One could argue conversely that, because they have been in the business for a longer period of time, positive long-term profits must exist for them to survive; remaining in business during periods of low returns could then be due to high transfer costs of exit and re-entry. Instead of relying only on the income from the cow-calf operation, producers who have off-farm employment or are retired are more resilient to economic and market crises affecting specific commodities. Therefore, these factors are expected to be negatively related to the probability of producer's stating that they are profit maximizers.

In the survey, producers were asked to rank the importance of other reasons (economic and social) for owning cattle and to rank expressions of attitudes about the cow-calf business as to how much they agreed with the expression. Other economic reasons included more efficient use of land and labor resources, improving cash flow, and increasing net worth. One would expect positive relationships with

these variables as they support the theoretical implications of profit maximization through striving toward production efficiency. Reducing risk is associated with the hypothesis of utility maximization and is therefore related to profit maximization indirectly through this notion. The importance of social reasons for owning cattle, however, is expected to negatively affect the probability of producers asserting to be profit maximizers. Social reasons included family heritage, being a part of the community, liking the lifestyle of ranching, relaxation and enjoyment, and keeping the ranch for the children.

Examination of these hypotheses will not answer the fundamental question of why so many multiple-output cow-calf producers claim profit maximization as their primary goal when such low average pre-tax rates of return have been documented for the industry. To begin to answer that question would require detailed examination of expected total household after-tax net returns for these producers with and without a cow-calf enterprise. The objective of this study is more modest but also of considerable importance, *i.e.*, what socioeconomic characteristics have the greatest impact on the probability of a producer perceiving himself or herself as a profit maximizer. That objective has not been addressed in any of the existing literature.

There may be a discrepancy between perception and reality, and it is the reality that is of interest here. Nevertheless, it is important to understand what creates perception. It is also possible that the primary difference between perception (as defined by the producer) and presumed reality (as defined by the economist) is the economist's failure correctly to define and measure the right variables. We have trouble enough correctly measuring actual (*ex post*) returns, let alone trying to measure expected (*ex ante*) returns. It is the latter information that is required to make a reasoned judgment on whether cow-calf producers in reality are profit maximizers. Expected returns also need to be defined for the household rather than just for individual agricultural enterprises or even for the whole farm or ranch. Therefore, we will concentrate here on identifying variables related in important ways to the probability of a particular perception.

## METHOD OF ANALYSIS

Given the discrete nature of the dependent variable (*i.e.*, whether or not the producer believes he/she is in the cow-calf business or to maximize profits), use of a qualitative response model is appropriate. Qualitative response models have been widely used in biometric applications and have become much more popular as an econometric tool for economic appli-

cations in such areas as program participation, adoption of technologies, welfare evaluation, and choices of credit (Bagi; Boggess et al.; Capps and Kramer; Capps and Cheng; Lee and Stewart). Here the application is an analysis of factors that affect the decision of producers to state whether or not they are in the cow-calf business primarily to maximize profits.

Three common specifications of the probability function are the linear probability model, the probit model, and the logit model. The logit specification was employed in this study:

(1)　$P_i = F(Z_i) = e^{Z_i} / (1 + e^{Z_i})$,

　　$Z_i = X_i'\beta$,　$-\infty < Z_i < \infty$,

where $P_i$ is the probability that the $i^{th}$ decision-maker seeks maximum profits, $X_i$ is the $i^{th}$ row of the nxk matrix of regressors, n is the number of observations, k is the number of coefficients, $\beta$ is the kx1 vector of parameter coefficients, and $u_i$ is the independently and identically distributed error term with zero mean. The logit specification was chosen because its distribution function is bounded by 0 and 1 (as is the probit), provides a good approximation to the cumulative normal function, and has computational advantages over the probit (Judge et al.; Amemiya).

Interpretation of the estimated coefficients in the logit model bears comment. Rather than indicating the increase in the probability of the event occurring (*i.e.*, stating that the primary motive is to maximize profits) from a one-unit increase in the corresponding independent variable, the coefficients measure instead the effect of a one-unit change in the independent variable on the logarithm of the probability ratio of $Y_i = 1$ (profit maximizer) to $Y_i = 0$ (not a profit maximizer), or $\ln[P_i/(1-P_i)]$. The amount of increase in probability depends on the original probability and thus on the initial values of all the independent variables and their coefficients. The change in P with respect to a change in X is therefore given by

(2)　$\partial P/\partial X_i = (\partial F/\partial Z_i)(\partial Z_i/\partial X_i) = f(Z_i)\beta$

　　　$= [e^{Z_i}/(1+e^{Z_i})^2]\beta$,

where $f(Z_i)$ is the logistic density function.

Where there are but a few or no replicated observations on each decision-maker, as is the case here, maximum likelihood estimation techniques are used. The maximum likelihood estimation is defined as the value of $\beta$ that maximizes the following log likelihood function:

(3)　$\ln L = \sum_{i=1}^{n} [Y_i \ln F(X_i'\beta)$

　　　$+ (1-Y_i)\ln(1-F(X_i'\beta))]$.

The maximum likelihood coefficients are consistent and asymptotically normally distributed allowing

application of conventional tests of significance (Judge et al.).

## Data

Data used in this study were from a 1986 mail survey of Texas cow-calf producers. The surveyed producers were drawn by the Texas Crop and Livestock Reporting Service as a stratified (by herd size) random sample of cow-calf producers who also produced at least one other agricultural commodity. Herd size categories were 1-49, 50-99, 100-499, and over 500 cows. The condition that they produced at least one other commodity was imposed to assure that all respondents had clear agricultural alternatives for resources. Responses from 377 producers (representing 38 percent of those surveyed and 1 percent of all cow-calf producers in Texas) were received. The number responding in each of the four herd size categories was 43, 95, 217, and 22, respectively, for response rates of 54, 42, 34, and 39 percent. Characteristics such as years of experience, acreages of pasture and crops, livestock numbers, employment status, and income information were solicited in the survey. Producers were also asked to rank the importance of each of a set of other reasons for being in the cow-calf business. See Young and Shumway for a summary of the responses.

Evidence clearly revealed that most Texas cow-calf producers who produce at least one other agricultural commodity perceive themselves as profit maximizers. Producers were directly asked if their objective in raising cattle was primarily to maximize profits. Of the 377 responses, 331 (89 percent) answered positively, 43 answered negatively, and 3 did not respond.

## Empirical Model

The following analysis seeks to identify the impact of producer characteristics and motivational variables on the probability of stating that the primary goal was to maximize profits. The empirical model employed for analysis was:

## Table 1. Variable Definitions

| Variable Name | Definition |
|---|---|
| PMAX | 1 if stated profit maximization was primary motivation; 0 otherwise |
| | **The following variables are structural characteristics of the cow-calf operation.** |
| PERCNT | percent of annual net income earned from operation |
| ACR2 | 1 if $100 \leq$ pasture acreage $< 220$; 0 otherwise |
| ACR3 | 1 if $220 \leq$ pasture acreage $< 500$; 0 otherwise |
| ACR4 | 1 if $500 \leq$ pasture acreage $< 1000$; 0 otherwise |
| ACR5 | 1 if pasture acreage $\geq 1000$; 0 otherwise |
| COWS | number of beef brood cows owned |
| OTHER | 1 if any other agricultural commodity was produced for cash sale; 0 otherwise |
| HUNT | 1 if leased land for hunting; 0 otherwise |
| YEARS | number of years in cow-calf business |
| WORK | 1 if producer employed off-farm or retired; 0 otherwise |
| | **The following variables are reasons for owning cattle: 1 if they were considered important; 0 otherwise** |
| OFFARM | cattle allows producer to work off-farm |
| NWORTH | increase net worth |
| LAND | making use of land adaptable for pasture only |
| CASH | selling cattle improves seasonal cash flow |
| FEED | cattle provide alternative to marketing feed produced on the farm |
| LABOR | making better use of labor resources |
| TAX | get tax advantages from owning cattle |
| LIFE | like the lifestyle of a rancher |
| RELAX | ranching is a way to relax and exercise |
| COMMNTY | raising cattle makes producer part of community |
| TRADITION | raising cattle is a family tradition |
| | **The following variables are opinions concerning the cow-calf business: 1 if the producer agreed with the statement; 0 otherwise** |
| BUSINESS | raising cattle should be strictly a business venture |
| RISK | raising cattle is a good way to reduce risk by diversifying |
| CHILD | producer wants children to go into ranching |
| FAMILY | producer should continue to ranch so that children can grow up on a ranch |
| SATISFY | personal satisfaction is reason enough to raise cattle |

$$
\begin{aligned}
(4)\ \text{PMAX} = {} & \beta_0 + \beta_1 \text{ YEARS} + \beta_2 \text{ COWS} \\
& + \beta_3 \text{ PERCNT} + \beta_4 \text{ OTHER} \\
& + \beta_5 \text{ ACR2} + \beta_6 \text{ ACR3} + \beta_7 \text{ ACR4} \\
& + \beta_8 \text{ ACR5} + \beta_9 \text{ WORK} + \beta_{10} \text{ HUNT} \\
& + \beta_{11} \text{ LAND} + \beta_{12} \text{ LABOR} \\
& + \beta_{13} \text{ OFFARM} + \beta_{14} \text{ CASH} + \beta_{15} \text{ TAX} \\
& + \beta_{16} \text{ FEED} + \beta_{17} \text{ NWORTH} \\
& + \beta_{18} \text{ TRADITION} + \beta_{19} \text{ COMMNTY} \\
& + \beta_{20} \text{ LIFE} + \beta_{21} \text{ RELAX} + \beta_{22} \text{ CHILD} \\
& + \beta_{23} \text{ FAMILY} + \beta_{24} \text{ BUSINESS} \\
& + \beta_{25}\text{SATISFY} + \beta_{26}\text{RISK}.
\end{aligned}
$$

Variable definitions are provided in Table 1. The first ten independent variables identify the structural characteristics of the cow-calf operations. The next 11 variables identify reasons for owning cattle. The last five variables are statements of attitudes about being in the cow-calf business.

## RESULTS

Descriptive statistics of the variables are given in Table 2. The means of the binary variables refer to the proportion of producers taking on the particular qualitative attribute. For example, on average, 21 percent of the producer's annual net income was

Table 2. Descriptive Statistics for the Dependent and Independent Variables

| | Mean | Standard Deviation |
|---|---|---|
| PMAX | 0.88502 | 0.31942 |
| PERCNT | 21.40083 | 27.48246 |
| ACR2 | 0.06336 | 0.24395 |
| ACR3 | 0.22589 | 0.41875 |
| ACR4 | 0.17080 | 0.37685 |
| ACR5 | 0.50964 | 0.50060 |
| COWS | 180.19559 | 237.24364 |
| OTHER | 0.68319 | 0.46587 |
| HUNT | 0.23967 | 0.42747 |
| YEARS | 28.92840 | 13.56960 |
| WORK | 0.52617 | 0.50000 |
| OFFARM | 0.37466 | 0.48470 |
| NWORTH | 0.60055 | 0.49046 |
| LAND | 0.68595 | 0.46478 |
| CASH | 0.33058 | 0.47107 |
| FEED | 0.26722 | 0.44312 |
| LABOR | 0.39669 | 0.48989 |
| TAX | 0.44077 | 0.49716 |
| LIFE | 0.60055 | 0.49046 |
| RELAX | 0.48485 | 0.50046 |
| COMMNTY | 0.38567 | 0.48743 |
| TRADITION | 0.55923 | 0.49716 |
| BUSINESS | 0.76584 | 0.42406 |
| RISK | 0.49862 | 0.50069 |
| CHILD | 0.36639 | 0.48248 |
| FAMILY | 0.39669 | 0.48989 |
| SATISFY | 0.48209 | 0.50037 |

Table 3. Maximum Likelihood Estimates of Logit Model

| Variable | Estimate (Standard Error) | Change in Probability[a] |
|---|---|---|
| PERCNT | 0.04120[b] (0.01572) | 0.00101 |
| ACR2 | 2.18948[b] (1.06776) | 0.05367 |
| ACR3 | 2.82497[b] (0.93113) | 0.06925 |
| ACR4 | 3.17564[b] (1.04923) | 0.07784 |
| ACR5 | 2.17629[b] (0.97525) | 0.05335 |
| COWS | 0.00313 (0.00211) | 0.00008 |
| OTHER | 0.27974 (0.43691) | 0.00686 |
| HUNT | 0.07404 (0.55665) | 0.00182 |
| YEARS | -0.01163 (0.01485) | -0.00030 |
| WORK | -0.39850 (0.46105) | -0.00977 |
| OFFARM | 1.07788[c] (0.63278) | 0.02642 |
| NWORTH | 1.53832[b] (0.77859) | 0.03771 |
| LAND | 0.22302 (0.48650) | 0.00547 |
| CASH | 0.20981 (0.77410) | 0.00514 |
| FEED | 1.14538 (1.25583) | 0.02808 |
| LABOR | -0.63432 (0.79309) | -0.01555 |
| TAX | -0.64171 (0.67673) | -0.01573 |
| LIFE | -1.30681[c] (0.60215) | -0.03203 |
| RELAX | -1.24384[b] (0.57525) | -0.03049 |
| COMMNTY | 1.64480[b] (0.84332) | 0.04032 |
| TRADITION | 0.91122 (0.58578) | 0.02234 |
| BUSINESS | 1.08503[b] (0.45478) | 0.02660 |
| RISK | 0.60373 (0.47659) | 0.01480 |
| CHILD | -1.06458[b] (0.48267) | -0.02610 |
| FAMILY | 0.86786[c] (0.49950) | 0.02127 |
| SATISFY | -0.18785 (0.46975) | -0.00461 |
| INTERCEPT | -1.95255[c] (1.10561) | |

[a] McFadden $R^2$ = .3083. Computations at sample means — $Z_i$ = 3.6576. $f(Z_i)$ = .0245 (value of logistic probability density function).
[b] Indicates statistically significant at $\alpha$ = .05 level.
[c] Indicates statistically significant at $\alpha$ = .10 level.

earned from the cow-calf business. Only 6 percent of the producers owned or rented less than 100 acres of pasture, while over 50 percent owned or rented 1,000 acres or more. Average herd size was 180 cows, and nearly 70 percent of the producers raised another agricultural commodity primarily for cash sale.

The maximum-likelihood estimates and the partial derivatives of the nonlinear probability functions evaluated at the mean (changes in probability) are presented in Table 3. All results were consistent with hypotheses 1 and 2, and two-thirds of the test results were consistent with hypotheses 3 and 4. However, not all were statistically significant (.05 level of $\alpha$ unless noted otherwise).

Of the five structural characteristics expected to be positively related to the probability of claiming to seek maximum profits (hypothesis 1), only two were

statistically significant. The greater the percent of income earned from the cow-calf operation, the higher the probability of producers' stating that they were in the cow-calf business primarily to maximize profits. A 10 percent increase in the proportion of total net income earned from the cow-calf operation significantly increased the probability of being a profit maximizer by 1 percent. Producers with pasture of 100 acres or more had significantly higher probabilities (5.3 to 7.8 percent) of stating that they were profit maximizers than those who had less than 100 acres of pasture. The highest probabilities were for those with 500-1000 acres of pasture. An increase in herd size of 125 cows increased the probability 1.0 percent; producing other agricultural commodities for cash sale (rather than just on-farm use) increased the probability 0.7 percent, and leasing land for hunting increased the probability 0.2 percent. However, none of these three variables was significantly related to the probability of claiming profit maximization as the primary objective.

Of the two structural characteristics which were expected to be negatively related to the probability of claiming to be a profit maximizer (hypothesis 2), both had the hypothesized sign but were not statistically significant. An increase of 33 years in the cow-calf business was required to reduce by 1 percent the probability of the producer asserting that he/she was in the cow-calf business primarily to maximize profits. The probability was also reduced only 1 percent by the producer's being employed off the farm or ranch or being retired.

Nevertheless, producers who stated that an important reason for owning cattle was that it allowed them to be employed off the farm or ranch (hypothesis 3) had a significantly (.10 level of $\alpha$) higher probability (2.6 percent) of claiming to be profit maximizers than those who did not consider this to be an important reason. Also consistent with hypothesis 3, producers who considered increasing their net worth an important reason for owning cattle and those who stated that raising cattle was foremost a business venture had significantly higher probabilities (3.8 percent and 2.7 percent, respectively) of claiming to be in the business to maximize profits. The remaining six economic motivation variables were not significantly related to the probability of claiming to be a profit maximizer. Four of the estimated parameters had the expected positive sign and two were negative. The probability of claiming to be a profit maximizer was increased 0.5 percent, 0.5 percent, 2.8 percent, or 1.5 percent, respectively, when important reasons cited for owning cattle included (a) making use of land suitable only for pasture, (b) producing cattle to improve seasonal cash flow, (c) providing

an alternative market for feed produced on the farm, or (d) reducing risk through diversification. The unexpected negative signs were on the two variables, making better use of labor resources and gaining tax advantages, each of which lowered the probability by 1.6 percent when cited as an important reason for owning cattle.

The results related to hypothesis 4, social motivations for being in the cow-calf business, were mixed. Five of the seven estimated parameters were statistically significant, but only three of the five had the expected negative sign. One would expect that when social reasons for owning cattle were important to the producer, there would be a decreased probability of producers stating that profit maximization was the primary goal of the cow-calf operation. Indeed, the probability of giving a positive response to the profit maximization question was significantly (.10 level of $\alpha$ for the first variable) reduced 3.2 percent, 3.0 percent, or 2.6 percent, respectively when important reasons for owning cattle included (a) enjoying the lifestyle of a rancher, (b) having cattle as a way to relax and get exercise, or (c) wanting their children to become ranchers. Contrary to the hypothesis, however, the probability of stating they were profit maximizers was significantly increased by 4.0 percent, *ceteris paribus*, for producers who raised cattle because it made them feel more a part of the community in which they lived. This may imply that the real objective in being a part of the community is to be a "successful" rancher. In addition, producers who stated that it was important to stay in the cow-calf business so that their children could grow up on a ranch had a significantly (.10 level of $\alpha$) higher probability (2.1 percent) of claiming to be a profit maximizer. A possible explanation for this may be that making a profit is often a necessity for the producer who expects to keep the ranch for children. The remaining social motivations, raising cattle because it is a family tradition and because of personal satisfaction, had opposite effects but neither was statistically significant. The former raised the probability of claiming to be a profit maximizer (contrary to hypothesis) by 2.2 percent, and the latter lowered the probability 0.5 percent.

Two measures of goodness-of-fit are appropriate in this analysis. The first is McFadden's $R^2$. It is expressed as $1-[1(\hat{\beta}_{m1})/1_0]$, where $1_0$ is the value of the log-likelihood function subject to the constraint that all regression coefficients except the constant term are zero, and $1(\hat{\beta}_{m1})$ is the maximum value of the log-likelihood function without constraints (Amemiya). It has a similar interpretation to $R^2$ in the standard regression model. It is bounded by

the zero-to-one range, and the closer it is to the one the better the fit. McFadden's R$^2$ of this model was .3083.

The second measure of goodness-of-fit involves the correct identification of those producers who claimed to be profit maximizers and those who did not by comparing outcomes that are selected on the basis of the explanatory variable information and actual outcomes. In this procedure the index Z is predicted for each decision-maker using the Xs and the estimated coefficient vector $\hat{\beta}$, *i.e.*, $Z_i = X_i'\hat{\beta}$. Using the logistic distribution and the index Z, the probability $\hat{P}_i$ of choosing the first alternative in the binary choice model is estimated from equation (2). If the estimated probability is greater than 0.5, then the first alternative is selected; otherwise the second alternative is selected. If the selected and actual outcomes match, the producer is correctly classified (Amemiya). On this basis, nearly 98 percent of the producers who said they were profit maximizers were classified as such. For those who claimed not to be profit maximizers, 35 percent were classified correctly. Overall, nearly 89 percent of the responses were classified correctly.

The likelihood ratio test indicated that the amount of variation explained by the model was significantly different from zero. The likelihood ratio test statistic is -2 log L = 184.08; this statistic gives a model chi-square of 80.07 which is significant at the .0001 level.

## CONCLUSIONS

This study used survey data from Texas cow-calf producers to determine factors affecting the probability that they perceive themselves to be in the cow-calf business primarily to maximize profits. Results of a logit model identified several factors related to production and economic efficiency that significantly increased the probability. These variables included size of pasture acreage, percent of income earned from the cow-calf operation, desire to increase net worth, perceiving cattle raising primarily as a business venture, and permitting the producer to have off-farm employment. Social reasons such as enjoying the lifestyle of ranching, wanting a child to become a rancher, and having a ranch as a way to relax significantly decreased the probability of producers' claiming to be profit maximizers. Other social reasons, such as having a ranch to be a part of the community and permitting children to grow up in a ranching environment, significantly increased the probability of producers' stating that they were in the cow-calf business to maximize profits.

Most of the empirical results were consistent with *a priori* hypotheses, and the dependent variable was significantly related to half of the independent variables. All significant economic motivations reinforced the probability of claiming profit maximization as the primary goal, and sociological-related motivations generally reduced the probability. However, two sociological motivations significantly increased the probability. Although no goal hierarchies were examined, it is apparent that, for these producers, perceived sociological goals were not entirely competitive with the goal of maximizing profits. Further, secondary economic goals were highly correlated with a primary profit-maximizing goal.

On the basis of overall goodness-of-fit to sample data, the logit model performed well in the sense that 89 percent of the cow-calf producers were correctly classified by primary motive. However, the model did much better in correctly classifying those who claimed to be profit maximizers than those who did not claim this objective as their primary motive for raising calves.

By way of the practical implications of these findings, consider two pairs of producers. The first pair includes (a) one full-time rancher with 2,000 acres of pasture and 400 cows, who receives 80 percent of his/her net income from the cow-calf operation and raises cattle strictly as a business venture, and (b) one part-time rancher with 99 acres of pasture and 20 cows, who receives 10 percent of net income from the cow-calf operation and views ranching as a way to relax and get exercise. In all other respects, the two producers are similar. The first producer would be 22 percent more likely than the second to view profit maximization as the primary goal for being in the cow-calf business. The second pair of ranchers are identical in all objectively-measurable ways. For example, they have the same acreage, herd size, and ranching experience. Their only differences are in their attitudes about the cow-calf business and their perceived reasons for remaining in the business. Yet one has as much as a 35 percent higher probability than the other of citing profit maximization as the primary reason for raising calves.

Thus, the view that the small, part-time producer is driven more than the large, full-time operator by objectives other than profit potential is borne out by these results. But, it is also clear that differences which are harder to measure than herd size or full-time versus part-time status can have at least as great an impact on the probability of the producer seeking to maximize profit. Development of extension programs and other educational and business activities aimed at serving such diverse clientele must con-

sider the substantive differences in motivations underlying their decisions. It is not enough to treat all producers as though they sought to maximize profit from their cow-calf operations.

These findings also suggest important research design criteria for seeking an answer to the fundamental question of why so many cow-calf producers claim to be profit maximizers when industry rates of return on investment are so low. The sample of producers for which detailed financial and planning records are examined must include a stratum of producers with characteristics that predict very different probabilities of seeking to maximize profit. The distribution of these characteristics among the entire cow-calf producer population also needs to be determined.

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