THE BEEF COW-CALF ENTERPRISE IN THE GEORGIA PIEDMONT: A CASE STUDY IN CONSPICUOUS PRODUCTION

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Economists have demonstrated considerable concern with the appropriateness of profit maximization as a sole firm objective.[1] Agricultural economists have adopted suggestions of economic theorists in writings on production economics; for example, Heady relaxed the objective of profit maximization to incorporate preferences for family consumption and risk aversion [8]. Production economics research has supported the theoretical reasoning for multiple firm objectives; in a recent article, Lin, Dean, and Moore state "... empirical studies explicitly employing the profit maximization hypothesis ... have generally provided results inconsistent with observed or plausible behavior" [11, p. 497]. Previous studies incorporating multiple objectives in analysis of agricultural production have largely been concerned with the general theoretical categories suggested by Heady. Lin, Dean, and Moore considered profit maximization and risk aversion [11]. Patrick and Eisgruber considered accumulation of net worth, annual net income for consumption, leisure, and risk-taking [14]; Hatch, Harmon, and Eidman included eight similar goals in their analysis [6]. These studies have followed the tradition in micro-economic theory of separate production and consumption decision-making. While previous analyses have departed from the perfect knowledge, static basis of conventional micro-economics, the major interaction between production and consumption decisions concerns the level and variability of income available for consumption.

Current production economics conceptions can be characterized by Thorstein Veblen's critique: "The end of acquisition and accumulation is conventionally held to be the consumption of the goods accumulated ..." [22, p. 35]. As an alternative, Veblen argued that the status or honor associated with particular economic activities must be considered; "The motive that lies at the root of ownership is emulation; ... The possession of wealth confers honor, it is an invidious distinction" [22, p. 35]. A particular topic for which Veblen's concepts may be appropriate is the level of the beef cow-calf enterprise in Georgia. Past studies on maximum profit farm organization have indicated that beef cows are not competitive with other enterprises [1, p. 7].[2] However, beef cattle are now an important agricultural enterprise in Georgia—cattle and calves have been the third or fourth largest commodity source of gross farm income in the 1970's [20, pp. 54-55]. This paper explores implications of Veblen's concepts for the level of beef cattle production in the Georgia Piedmont. In particular, the hypothesis that a beef cattle herd has direct utility to a farm operator, in addition to its income producing capacity, is formulated into a multi-objective model of farm organization. The model is evaluated for a representative farm situation.

CONSPICUOUS PRODUCTION AND BEEF CATTLE HERDS

Veblen's concepts, as presented in *The Theory of Leisure Class* [22], hypothesized that economic

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[1] McGuire has an exhaustive survey of literature on critiques of and alternatives to the economic theory of the firm advanced before 1964 [12].

[2] Research for other geographical areas—for example, Illinois [21], Missouri [10], Nebraska [16], Louisiana [17], and Texas [7]—have also understated the number of cows actually produced.

behavior was strongly influenced by conventional institutions concerning social status. Such concepts as pecuniary emulation, conspicuous leisure, and conspicuous consumption described the behavior of people to demonstrate economic success and therefore status. While Veblen recognized that certain occupations had superior status, he did not preceive that status of production activities in general could influence production decisions. For this paper, Veblen's concepts are broadened to include conspicuous production, defined as production activities associated with improvement of social status rather than maximizing or stabilizing income.[3]

The existence of conspicuous production of beef cows can be based on an historical relationship between beef cattle production and other attributes of social status in agricultural social systems. As with many social institutions, this association was largely based on previous technological and economic conditions. For purposes of understanding current beef production levels, the past imputation of status to the beef cow enterprise could still exist, even though modern production practices and opportunities have greatly altered. This proposition is in full accord with Veblen's analysis. His position is that "Institutions are products of the past process, are adapted to past circumstances, and are therefore never in full accord with requirements of the present" [22, p. 133]. Therefore, past patterns of beef cattle productions would suggest the current existence of conspicuous production.

The plausibility of status from beef cattle production can be readily documented with historical writings and data. According to Zimmermann, commercial beef cattle production in the United States began as a range or ranch enterprise with extensive land utilization for grazing purposes and large land holdings per firm. In part, this size was a result of achieving sufficient scale to earn an income comparable with other agricultural enterprises. Initial concentration of beef in semi-arid or arid climates further increased the land size required to earn opportunity costs for nonland resources [24, pp. 291-305]. As the frontier closed, competition for range land with crop enterprises resulted in a large capital investment per unit—Ely and Wehrwein stated in 1940 that "A ranch . . . involves a larger investment than a farm . . ." [5, p. 235]. Thus, early beef cow units were associated with larger land acreages and capital investments than agricultural units in the East.

Early beef cow enterprises on general farms in Georgia were also associated with large land units. Using 1910 county data for Georgia, the Spearman rank correlation between number of beef cows per acre of land in farms and percentage of farms larger than 260 acres is 0.474. In part, this association reflects the same resource allocation process that resulted in Western specalization in beef—the rank correlation between cows per acre and percentage of unimproved land in farms is 0.731.[4] However, it is likely that beef cows were concentrated on larger farms within each county in addition to being concentrated in counties with a higher percentage of unimproved land. Data in Table 1 demonstrate the 1950 concentration of beef cattle on farms with larger gross sales as compared with dairy cows and swine. The percentage of beef cows on Class I-III farms was higher than that of milk cows and swine on Class I-III farms and lower on the Class IV-VI farms.

Thus, both national and state production of beef cows have been associated with large agricultural units. Historical imputation of status to beef cow herds is therefore quite plausible, considering size and income levels are standard rural indicators of status. Given the recent existence of this pattern, farmers today would be expected to be conspicuously producing beef cows.

AN ECONOMIC MODEL OF CONSPICUOUS PRODUCTION

The impact of conspicuous production on farm organization can be analyzed with an adaptation of the standard neoclassical model of the firm. To allow preferences for particular enterprises, a utility function is maximized subject to a production function and a profit function:

(1) Maximize $U = U(X_i, \pi)$
subject to $F(X_1, X_2, \ldots X_n) = 0$
and $\pi = \sum_j P_j X_j$
where π is profit
X_j are inputs and outputs
P_j are prices
and X_i is the level of an enterprise subject to conspicous production.

[3] Examples of conspicuous production are recognized in the literature. Heady identified farm ownership as related to this objective (8, p. 430). Rogers suggests that purchase of "new farm machinery and show-place farm buildings" may serve as status symbols (15, p. 122).

[4] Both correlations are significant at the 1% level. The data for these calculations were obtained from the 1910 Census of Population [19]. To facilitate computations, the data were aggregated into groups with the first group including the five counties with the greatest number of beef cows per acre, the second group the next five, etc.

Table 1. **DISTRIBUTION OF NUMBER OF LIVESTOCK BY ECONOMIC CLASS OF COMMERCIAL FARMERS IN GEORGIA IN 1950**

	Dairy Cows		Hogs & Pigs		Beef Cows	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
All Commercial	238,696	100	1,365,560	100	206,334	100
Class I	18,547	7.8	55,565	4.1	31,046	15.0
Class II	37,432	15.7	118,271	8.7	41,240	20.0
Class III	35,871	15.0	218,270	16.0	41,164	20.0
Class IV	48,459	20.3	385,485	28.2	40,575	19.7
Class V	56,442	23.6	385,352	28.2	35,776	17.3
Class VI	41,945	17.6	202,617	14.8	16,533	8.0

SOURCE: *1954 Census of Agriculture,* Table 27 [18].

To consider the impact of conspicuous production in farm organization, it is necessary to compare the equilibrium level of enterprise X_i under profit maximization and utility maximization. This information is provided by the optimal rate of product transformation between X_k, any other enterprise, and X_i. With profit maximization, the optimal rate of product transformation with multiple products is presented in (2):[5]

$$(2)\ -\frac{\partial X_k}{\partial X_i}=\frac{F_i}{F_k}=\frac{P_i}{P_k}$$

where, F_j are partial derivatives of the production function. Under the assumption of increasing rate of product transformation, increasing X_i would increase the rate of transformation. Therefore, if the optimal level of X_i under utility maximization is greater than under profit maximization, $F_i/F_k > P_i/P_k$.

The optimal rate of product transformation between X_i and X_k can be derived from necessary conditions for optimization. After taking the total differential of (1), setting $dU = 0$, and holding other output and inputs constant, equation (3) can be derived:[6]

$$(3)\ -\frac{\partial X_k}{\partial X_i}=\frac{F_i}{F_k}\ \frac{U_i + U_\pi P_i}{U_\pi P_k} > \frac{P_i}{P_k}$$

where F_j and U_j are partial derivates.

This model demonstrates that conspicuous production of beef cows would result in larger herd sizes than would be present under profit maximization. Equation (3) indicates that the marginal utility of beef cows equals price times the marginal utility of profits, plus their direct marginal utility. In contrast, other enterprises have a marginal utility equal to price times marginal utility of profits. Thus, more beef cows would be expected to be produced with utility maximization than with profit maximization.

AN EMPIRICAL EVALUATION OF CONSPICUOUS PRODUCTION OF THE BEEF COWS

A behavioristic approach is adopted for the empirical evaluation of the conspicuous production model for beef cow production in the Georgia Piedmont. Production possibilities for a representative firm are estimated and associated with different forms of utility functions. Empirical applicability of different formulations of objectives

[5] Equation (2) is derived from the necessary conditions for profit maximization for a multiple product firm. Henderson and Quandt (9, pp. 72-75) and Cohen and Cyert (4, pp. 122-128) have a formal development of this relationship.

[6] Equation (3) is a more general statement of the optimal rate of product transformation than (2). If the firm owner only derives utility from profits, $U_1 = 0$ and (3) is equivalent to (2).

are then contrasted with actual level of beef cow enterprises for farms of similar size.

Estimation of a Production Possibilities Frontier

The production possibilities frontier for this analysis was derived with linear programming methods suggested by Mundlak [13]. First, a standard linear programming problem is maximized for one objective such as profits; then a problem is maximized for a second objective with the problem constrained by the first objective. For the problem of this paper, the second linear program would be of the form expressed in Equation (4):

(4) Maximize x_i

subject to

$Ax \leqslant b$

$c'x \geqslant \lambda\pi_o$

$x \geqslant 0$

where π_o is maximum profits (under standard programming methods) and λ is a scalar such that $0 \leqslant \lambda \leqslant 1$.

Through parametric programming, the maximum level of the second objective is determined for different values of the first. The procedure is then repeated to determine maximum values of the first objective subject to varying levels of the second. These two procedures provide an estimate of the production possibilities frontier expressed in the two objectives.

To determine a frontier for profits and beef cows, this study utilized a linear programming model of a representative farm developed by Cho-Chung-Hing [3]. Activities in the model reflected current production possibilities in the Georgia Piedmont with good management as recently budgeted by Wise [23]. The farm had 243 acres of open land with 189 acres of cropland and one full-time farm manager-laborer. The beef cow-profit frontier from this model is presented in Figure 1. Points defining this frontier are beef cow levels and profits at basic changes in the parametric linear programming model. Dual values associated with increasing beef cows are the rates of transformation between cows and profit. The rate of transformation is constant between points presented in Table 2.

Points of particular interest are labelled in Figure 1. Between points A and B, which have 0 and 16 cows, respectively, cows and profits are complementary. Maximum profits of $10,041 are achieved with 16 cows. Between points B and E more cows are possible only with a decrease in profits. Resources available to the representative farm allow production of a maximum of 133 cows which are associated with a profit level of $5,173 at point E. Complete specialization in 133 beef cows yield profits of $3,195 (point F).

Within the range of consicuous production,

Figure 1. PRODUCTION FRONTIER FOR BEEF COWS AND PROFITS FOR A REPRESENTATIVE FARM IN THE GEORGIA PIEDMONT

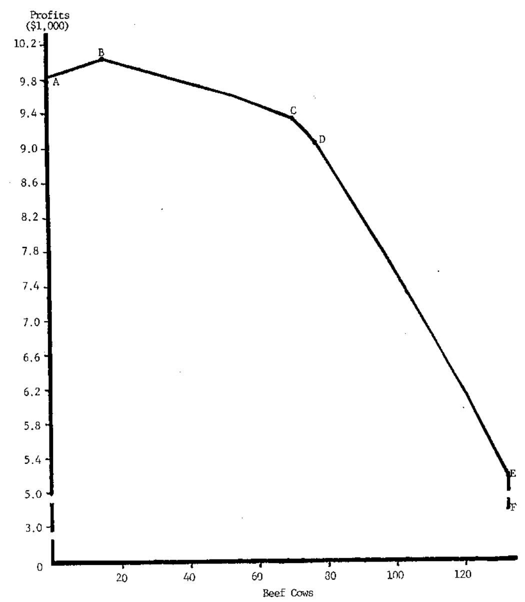

Table 2. SELECTED POINTS ON THE BEEF COW-PROFIT FRONTIER FOR A REPRESENTATIVE FARM IN THE GEORGIA PIEDMONT

Profits (in dollars)	Beef Cows	Rate of Transformation
9,848	0	-12.85
10,004	12	-11.04
10,036	15	- 5.31
10,041	16	2.49
10,039	17	11.22
9,927	27	11.76
9,722	44	12.27
9,620	53	14.34
9,415	67	16.47
9,403	68	18.84
9,380	69	20.59
9,332	71	37.13
9,267	73	44.12
9,171	75	45.42
9,062	77	51.90
9,056	78	62.49
8,493	87	66.39
7,811	97	68.67
6,799	112	72.06
6,181	120	73.52
6,035	122	76.35
5,868	124	77.71
5,173	133	—
3,195	133	

points C or D would be expected to approximate the optimal level of beef cow production. Rates of transformation included in Table 2 indicate that increasing cows above 78 at point D results in a reduction of profits of $62.49 per cow, while increasing cows up to 71 at point C has a rate of transformation of 20.59 per cow. Thus, C or D would indicate maximum utility for a considerable range in the rate of substitution of profits for cows in the utility function of farm owners. Of course, preference functions could exist which would result in the optimum being between D and E. However, such a high rate of transformation between cows and profits would not likely be consistent with behavior strongly influenced by status considerations. Profits, and particularly uses of profits for consumption or investment, are also associated with status, so that preferences which can be characterized by Veblen's concepts would be expected to value both cows and profits. There, a farmer with preferences cognizant to social status and resources of the representative farm would be expected to have a beef cow herd between 71 and 78 cows.

Empirical Relevance of the Model

Survey data collected by Allison [1], [2] on beef cattle production in Georgia provide a source of information to test the utility maximization model. In his report on owners' conceptions of the beef enterprise, Allison does support the conspicuous production hypothesis when he states: "A sizeable portion of those farmers who have just increased herd sizes gave psychological factors (father was cattleman or enjoyed raising beef) as the main reason for including the beef operation in their organization." [1, p. 24]. More importantly, actual data on beef herd sizes and land utilization can be contrasted with the beef profit frontier for the representative analytical farm. Allison reports that average acres of open land for herds of 50 to 99 cows in the Piedmont was 297 acres which was the closest to the representative farm of any averages for other herd sizes [1, p. 16].

Additional evidence was obtained from tabulation of survey data on the 16 sample farms in the Piedmont with 150 to 350 acres open land: four had 20 to 49 beef cows, seven had 50 to 99 cows, and six had no cows (2). The most striking feature of this tabulation is the absence of any herds of less than 20 cows. This is in the range of the profit maximizing herd size for the representative analytical farm. In addition, nearly half the cases had more than 50 cows, which is within the utility maximization range of the theoretical and empirical analysis. The existence of six farms with no beef cows does confound the evaluation of the model, in that the same utility maximization model does not apply to every farm unit in the sample. However, farms with no cows may have a different land base than the representative analytical farm. Allison reports that 99 percent of the open land was cropland on farms with 0-9 cows and 100-199 acres of open land, and 97 percent cropland on farms with 0-9 cows and 200 or more acres of open land. For farms with 50-99 cows, the percentage of cropland was 80, which is similar to the 77 percent on the analytical farm [1, p. 16]. Thus, crops may have been more competitive with beef on the nonbeef farms because of the higher percentage of cropland than on the analytical farm.

Survey results on land utilization provide further support for the utility maximization model. Allison reports 16 percent idle openland on farms with 50-99 cows in the Piedmont [1, p. 16]. These observed acres more closely correspond to acreages predicted by profit maximization. With profit maximization, 120 of the 243 acres on the representative farm were idle. The increased numbers of cows predicted by utility maximization are associated with more complete land utilization. With 53 cows, 42 acres of idle land is present; however, with 68 or more cows, no idle land exists. Since Allison's data indicate that some idle land is characteristic of the Piedmont, an optimal herd would likely be no larger than 71 cows (point C).

CONCLUSIONS AND IMPLICATIONS

This paper evaluates the possibility that a utility maximization model could explain the level of beef cow production in the Georgia Piedmont more accurately than a profit maximization model. The utility model incorporated the hypothesis that beef cows are a form of conspicuous production, resulting from their historical association with agricultural indicators of social status. Based on an analysis of a representative farm situation, the optimal organization was in the range of 71 beef cows and profits of $9,332 compared to 16 cows and profits of $10,041 at profit maximization. The rate of substitution between profits and beef cows under utility maximization is approximately $20 per cow. Survey data on beef production in the Georgia Piedmont collaborated the utility maximization result.

Limitations of this analysis must be stressed. In particular, alternative multiobjective formulations to reflect risk aversion and/or income tax management, could also be consistent with divergence from profit maximization. Further analysis of alternative formulations is necessary to fully evaluate the importance of Veblenesque behavior in beef production both in Georgia and in other states.

Methodology utilized in this study has implications for production economics research in topics other than beef cattle production. Conventional separation of production and consumption decisions for analytical ease can severely limit the validity of production analysis in the presence of historical relations between status and inclusion of certain commodities in the production process. Other commodities may also currently have positive or negative utility to farm operators. If these preferences are correlated with relative variability of enterprise outputs, production patterns based on personal preferences may be attributed to risk aversion. Thus, consideration of personal preferences is important for valid agricultural production forecasting and policy prescription.

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