

Relating Ranch Prices and Grazing Permit Values to Ranch Productivity¹

WILLIAM E. MARTIN²

Associate Professor of Agricultural Economics, The University of Arizona, Tucson.

Highlight

The hypothesis is offered that all "outputs" produced by an investment in a cattle ranch have not been included in previous conventional analyses. These other "outputs" include tax shelters, land (and lease) appreciation, farm fundamentalism, and conspicuous consumption. Since these additional outputs are as much a part of the return on investment as is the output beef, they might well be considered in evaluating use fees on public lands.

Recent research on costs and returns in the western range cattle industry shows returns to capital and management ranging from very low to negative in all areas studied (Caton, 1962, 1965). These results were especially pronounced in Arizona. Here, price per hundredweight of beef exceeded cost per hundredweight only if all interest on investment was excluded as an opportunity cost and if herds exceeded (depending on the area) 200 to 300 cow-units in size (Martin and Goss, 1963). Yet, we note that ranchers continue to remain in business and that ranch sale prices remain at levels so that computed net returns in ranching are negative if an opportunity cost for capital is included.

At the same time that ranchers are apparently producing negative profits, there has been considerable interest by individuals and groups in both public and private life to raise public lands grazing fees. The essence of this argument is that ranchers are now paying less than the full value of the marginal product of the grazing permit as their monthly rental fee to the relevant governmental agency (either the Bureau of Land Management, the Forest Service, or the state land agency).

To summarize, raising beef is not a profitable operation given current ranch sale prices (at least in Arizona); yet, there is continued pressure to raise the level of public lands grazing fees. This pressure exists because of a general belief that grazing fees on public lands are below levels that would prevail in a free, competitive market—that is, below the level of the permit's marginal value product (MVP). (MVP is the value of the additional output produced by the last unit of input applied. An economic optimum is achieved when the user is applying inputs so that the marginal value product is just equal to its cost.)

The importance of public lands to the Arizona cattle ranching industry and to ranch sale prices should be emphasized. Private lands comprise only 20.4% of the State's total grazing area (Jefferies, 1964). In the western desert portion of the State, only 0.4% of a ranch is typically privately owned. In a sample of 66

bona fide ranch sales occurring between 1957 and 1963 in Arizona BLM grazing districts 2 and 3, the BLM Section 15 areas, the intermingled State lands, and the Tonto National Forest, 9.46% of the ranch lands were privately owned. The average sale price for these ranches (including the deeded lands and the public grazing permits) was \$932 per rated animal unit if the ranch was stocked and \$599 per rated animal unit if no cattle were included in the sale (Jefferies, 1964). Our estimates of reasonable sale prices, given the single objective of raising beef for market, range from \$200 to \$250 per cow-unit for unstocked ranches if the ranch is large enough to take advantage of all economies of size. Most ranches are not that large and would have lower average values per cow-unit.

The above facts raise the following questions. First, what are the reasons for the high level of ranch sale prices? Secondly, can we measure the relative contributions of the resource components contributing to this sale price? Thirdly, could we use these measurements as a basis to rationalize the levels of public grazing fees? The answers to these three questions have two sets of implications. One is toward a workable fee policy that would extract the full value of the range resources for the public. The second is for economists and range managers in general.

Why are Ranch Sales Prices High?

There seems to be some problem of evaluation, either by the ranchers who are apparently receiving negative returns on their investment, or by we agricultural economists and range managers who usually base our analyses simply on the returns from beef production alone. Either the opportunity cost of capital³ is not recognized by

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ranchers or *all returns* to ranching have not been recognized in the analyses.

Both conditions may hold true. First, there are ranchers who purchased or inherited property before the great increase in land values. These people may remain in ranching by sacrificing an opportunity to sell their land and invest the money more profitably elsewhere. They are only sacrificing an opportunity; their cash income may exceed their cash expenses. But what of the people who are purchasing ranches at present-day prices? We would argue that modern day ranching, at least in Arizona, is not simply a business of raising cattle and selling beef. Ranchers are also landholders (and public lands leaseholders) and thus may be speculators seeking capital gains. Where land and leases are held in anticipation of appreciation in value, not all of their costs should be charged against the business of raising cattle. A part of this investment cost is the cost of holding land and leases for speculative purposes.

Also, it has been alleged that the federal income tax laws have made ranching an excellent tax shelter for investors with outside incomes. Here the additional "output" would be the tax savings made possible through converting ordinary income into capital gains. Again, part of the investment and operating costs should be allocated to this other output of the ranch.

There are two other motives which may contribute to the economists' computations of low net income, "ranch fundamentalism," and "conspicuous consumption." The first operates through those groups of people

who know no other way of life and/or who romanticize the carefree independent life of the cowboy. Our agricultural colleges in the West are full of this type of student (especially in animal science departments) though we doubt that many will have the wherewithal to affect investment costs much in the future. Conspicuous consumption is probably much more important. Much of Arizona society revolves around the ranching families, and people interested in this aspect of "output" are much more likely to be in a position to also take advantage of the capital gains output.

Thus, we argue that it is unrealistic to compute cattle ranch costs and returns simply on the basis of one output—beef. In addition to beef, there are the relatively nonquantifiable outputs of farm fundamentalism and conspicuous consumption, as well as possibilities for the monetary outputs of tax shelters and ranch appreciation. These outputs are not competitive but are additive. Receiving more of one does not imply receiving less of another. If these additional outputs were included in our evaluation of the costs and returns of cattle ranching, perhaps the prices paid for cattle ranches would appear perfectly rational. Investors are purchasing both a resource to be used for production purposes as well as a resource for personal consumption.

The fact that much of the land being purchased is not deeded land but only the right to use government leases, does not materially alter the results. Control of leases offers the same opportunities for tax shelters, speculation, farm fundamentalism, and conspicuous consumption as does actual ownership of land. Of course, differing tenure rules, as well as different productivity opportunities (both

for beef and the "other outputs") affect the sale price of each type of lease.

When deeded land is purchased, the value of that land to the purchaser is the capitalized value of the expected net returns to the land. Similarly, if the value of a government lease is above its rental price, the lease will carry a sale value upon transfer.

It has been shown that under current grazing fee policy there will be a positive value to be capitalized into a sales price for a lease (Roberts, 1963). This is true even if beef production is the only output. But sales prices for leases are very much higher than this difference due to beef productivity alone would warrant.

In the following discussion we will present some numerical estimates of the total size of this difference as well as some comments on the relative size of the factors not related to beef. These estimates may be relevant when people discuss fee setting policy.

Estimating Relative Values of Range Resources

Tax Saving Opportunities.—A study of the possibilities of the Arizona ranch as a tax shelter has just been completed (Gatz, 1965). The analysis looked at net tax effects, independent of land or lease appreciation. Results show that there is a real value to this extra product. However, under current tax laws, this value is not nearly large enough to be the major "additional output" to beef production.

In fact, even if we assume investors in the highest federal income tax brackets (where potential savings would be the greatest) tax savings will rarely average more than 0.5% of the capital investment over time. The percent return would have to be nearer 5% to provide a complete explanation of high ranch prices.

³The opportunity cost of capital is the amount of money that could be made if the rancher were to sell out and invest his capital in some alternative enterprise.

Lease Values and Grazing Fees.—Since the tax shelter aspect of cattle ranching is not large enough to explain the difference between the ranch's value for beef production and its market price, the expectations of grazing land appreciation, in combination with the consumption aspects of ranching, must be the major explanatory factors. For the moment, let us simply accept that investors each have their reason for purchasing a cattle ranch and go on to analyze the value of each component of land resource on the basis of the investors' actions in the market. The size of these empirical estimates, when compared with other available data, will give us further insights into the relative values of the speculation and consumption components of ranch price.

From 1957 through 1963 a total of about 160 bona fide ranch sales occurred in the Arizona areas mentioned above. The purchasers in 66 of these transfers were interviewed relative to variables affecting the sale price (Jefferies, 1964). Data gathered included items such as date of sale, total sale price, amount of deeded land, types, amounts and qualities of public lands, and number of cattle included in the sale. Other information obtained included the miles of deeded frontage on a main road, the distance from the nearest urban center, the percent of purchaser's gross income that was derived from cattle ranching, whether the purchaser bought the ranch for tax shelter purposes, and the tax bracket of the purchaser when he bought the ranch.

Multiple regression analysis was used to develop equations that would "explain" the sale prices of the ranches as a function of the amount of deeded land, the animal units for each of the forest, BLM, and State

permits, the number of animals involved in the sale, and time. The parameters derived directly gave the marginal value of each component of the sale as well as the trend in land values and permit values over time.

(The general form of the equation was:

$$P = f(D, F, B, S, A, t).$$

Where

P is the total sales price of ranch in dollars

D is the amount of deeded land in acres

F is the number of forest permits in animal units

B is the number of BLM permits in animal units

S is the number of State permits in animal units

A is the number of breeding animals, one- and two-year-old steers, and stocker heifers sold with ranch

t is the year in which the ranch was sold.

All animal units were for year-round grazing, and were based on the rancher's actual use of the land rather than on agency suggested stocking rates. This increases the animal units figure on state and section 15 BLM lands by a factor of about two. Other variables such as cattle prices, value of improvements, population-distance indices, frontage of deeded land, and ranch elevation were used in preliminary formulations but proved nonsignificant.)

More than a dozen regression formulations were run in an effort to achieve the best fit consistent with our goal of obtaining the marginal values of an animal unit of grazing permit. Four equations were selected that gave similar results for the regression coefficients, none of which could be said to be more satisfactory than the other. Final estimates were computed by averaging the results of these four equations. The multiple R² on these equations varied from .62 to .67; all coefficients were statistically significant at the one percent level of probability. There was no problem with multi-collinearity. Partial correlation coefficients between the independent variables ranged from zero to .47.

Our estimates of the marginal

permit values are as follows: Forest Service—\$274.56 per animal unit; BLM—\$154.79; and State—\$302.44/AU. Deeded lands carried a marginal value of about \$18/acre. These values may be converted to an AUM basis by dividing by 12. This would make an estimated market value of \$22.88, \$12.90, and \$25.20/AUM for Forest Service, BLM, and State permits, respectively.

These values represent an estimate of the capitalized value of the difference between public grazing fees in Arizona and the apparent marginal value product of the public grazing permit, (that is, their full competitive value), as expressed by the investors themselves in the market place. It is the total value and not just the value due to the production and marketing of beef.

Discounting procedures may be used to convert our capitalized marginal values in terms of sale price into marginal values in terms of permit fees. For example, if a rancher is willing to pay \$280/AU for a forest permit, then this amount must be the capitalized difference between the fees charged by the Forest Service and the expected annual net returns from having possession of the permit. (Annual returns are here defined as total

⁴The simple capitalization formula is:

$$V = \frac{R}{r}$$

where V is the present value of a stream of future revenue, R, forthcoming at a constant rate per year over an infinite period of time; and r equals the appropriate market rate of interest.

Algebraic manipulation gives us the discounting formula used in this analysis:

$$R = V r$$

where R equals the discounted fee differential; V is the sale value of the permit (obtained from the regression analysis); and r is the discount market rate of interest.

returns less utilization costs not including grazing fees.)

When discounted at 6%, a \$280 sale price becomes equivalent to a \$1.37 monthly fee.⁴ This value represents an approximation of the actual difference between the forest grazing fee in Arizona and the apparent marginal value product of the permit, that is, its full competitive value.

The MVP of each type of grazing permits (less nonfee utilization costs) may be computed by adding the fee to the difference (Table 1). For example, if we use a discount rate of 6% and the 1962-63 grazing fees, the net value is estimated to be \$1.75/AUM for forest lands, \$1.08 for BLM lands, and \$1.91/AUM for State lands.

Ranchers are effectively paying the above fee rates right now. For new owners most of the payment goes to private individuals in the form of a sale price. For old owners the major portion of the rate is in the form of an opportunity cost.

Private Rental Lands and Lease Appreciation.—Contrary to our expectations, our statistical analysis showed no significant trend in ranch sale prices over the last seven years (Martin and Jefferies, 1965). Graphic analysis in terms of sale value per cow-unit suggests that prices continued to rise until 1959 and have remained stable since. If expectations of rising land and lease values have been a factor contributing to high purchase prices, these expectations have not lately been realized.

Another view of the land and lease appreciation problem may be had by comparing the discounted prices of government grazing leases

with monthly rental fees for private lands.

Gardner (1962) reported that private rental fees were somewhat higher than the discounted value of government permits. He attributed the values of both the private and public grazing lands strictly to their beef producing potential. The difference in value suggested to him that public lands were being misallocated among potential beef procedures.

However, if our hypothesis about extra outputs on public land is correct (and if private lands were rented strictly for their beef producing potential), we would expect the actual values for public lands to be *higher* than for private rentals. These values are not higher; we doubt that misallocation could be the whole answer.

Even more peculiar, rental fees on private grazing lands, when converted to a present value sales price equals \$649/AU (Gardner's average rental fee capitalized at 6%). Evidently, private lands are not rented merely for the purpose of profits from beef production either! This single purpose would imply sale values of only \$200-\$250/AU.

Why are people willing to pay such high monthly rental fees for private grazing lands? The answers must be much the same as for the purchases of government leases. They may need rental land as part of a tax shelter. While the opportunities for tax savings on private rental lands differ from those on government leases, they still exist. You do not need to own the lease for ranch fundamentalism and conspicuous consumption. Furthermore, because of economies of size in cattle ranching, the marginal value product of an additional block of rental land may be considerably higher than the average value product of the whole ranch. Most ranches

are much smaller than the size where long-run average costs become constant (Martin and Goss, 1963). (Because large ranches can produce beef at a lower per-unit cost than small ranches, it may often make sense for a rancher to pay very high prices in order to expand his present operation. He could not afford to pay this same per-acre price for a complete operation.)

The major difference is that renters of private lands have no opportunities to reap the benefits of lease appreciation. But since private rental rates are comparable in size to the discounted value of lease sale values, it suggests that expectations of land appreciation may not loom large in investors' decisions to purchase a lease. Since tax shelter opportunities are not large relative to the differential to be explained, the major reason for high ranch prices must be the consumption related outputs.

Summary and Conclusions

It was shown that government grazing land leases have a market value considerably above their monthly rental fee. This value is capitalized into a transfer price for the lease. This extra value cannot be explained by the value of the land for beef production alone. Neither is the full explanation due to the value of a ranch as a tax shelter nor the expectations of land and lease appreciation. Apparently these high ranch prices are not based on the profit motive. Rather, ranch purchasers are simply paying for the privilege of being ranchers.

The final question is this—could our public agencies charge rates equivalent to what purchasers are now paying in the market as a monthly grazing fee without reducing the use of the public range below its present level? Certainly not. These estimates are based on market prices. The majority of people now holding ranches could not afford to pay such prices in cash even though they are willing to pay the price in opportunities

Table 1. Capitalized values (in dollars) of AUM of grazing permits, Arizona, 1957-1963.

Type of permit	MVP of grazing permit minus actual fee Difference valued at			Average fee for	
	4%	5%	6%	1957-1961	1962-1963
Forest	.92	1.14	1.37	.36	.38
BLM	.52	.64	.78	.20	.30
State	1.01	1.26	1.51	.37	.40

foregone. Such a rate level would have the effect of putting all public leases on the market at the same price now being paid for leases on the margin.

Higher fees could be approached in a step-wise fashion; but, even if differences in location, type of grazing, and other quality related variables did not exist,⁵ all ranches could not afford to pay the same grazing fee. As long as economies of size exist, the value of an extra unit of grazing will differ between ranches. Even more importantly, the value of the "other outputs" is more closely related to the income position of individual potential investors than to the grazing potential of the range. Since it is impossible to know the income position of all possible investors (even if we could know the beef production function for each range) neither flat fee levels nor even fee formulas based on physical production criteria could eliminate the capital value of all leases without drastically reducing the use of the range.

Since the market remains the final arbiter of price no matter how complicated our institu-

tional rules may be, how much simpler it would be if grazing permits were simply put on the block to the highest bidder—perhaps in conjunction with a floor price high enough to keep the bidders honest⁶. This procedure would extract the competitive market price of the public range for the public coffers, allow our citizens to compete for the consumption aspects of the ranching industry, and at the same time keep our ranges producing beef.

And how much more rewarding it might be to us economists and range managers to acknowledge that ranching is a complex investment in several outputs. Such an investment requires a great deal more analysis than our traditional analyses related only to the most obvious products—grass and beef.

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⁶Such a procedure is outlined in detail for state owned federal grant lands in Wennergren and Roberts (1965). This procedure could apply equally as well to federally controlled lands with only minor adaptation.

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⁵Roberts and Topham (1965), have developed equations showing differences in user costs between various types of Utah ranges.



Management Features

(Editors Note—The following five papers were presented at the ASRM Annual Meeting in New Orleans, Louisiana, February 1 to 4, 1966. They are longer than the usual Management Notes in the Journal, and are published here as a group because they should interest ranchers and other practicing range managers. The papers by Edwin E.

Marsh and Floyd F. Higbee were presented in a panel discussion of "Current Challenges in Range Management." The papers by J. L. Schuster and R. C. Albin, George Skeete, and Jim Wilson were given at similar sessions of interest to rangeland managers.—R. S. Campbell.)