Finding the Appropriate Forage Value for Analyzing the Feasibility of Public Range Improvements

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Finding the Appropriate Forage Value for Analyzing the Feasibility of Public Range Improvements

Fred J. Wagstaff
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RESEARCH SUMMARY
To complete economic analysis of range improvements completed on the Oak Creek Management area of central Utah, we needed an estimate of the value of forage. A review of the literature revealed several methods of estimating forage values. These methods yielded eight estimates of public rangeland forage ranging from $1.23 to $30 per animal unit month (AUM). Six of the estimates were based on actual market transactions or current administered prices and were the most reflective of actual economic processes. The best estimates of value were those for leasing similar rangeland in the immediate area.

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INTRODUCTION

The concern about finding the value of range forage on public lands has been with us for many years. The Federal Government has long been concerned with determination of grazing fees based on fair market values (Sutton 1988; Andrus and Berglund 1977). The search for the appropriate value for public land forage has led to many studies throughout the years using different approaches and resulting in a multitude of recommendations (Clawson 1931; Craton 1949; Roberts 1963, 1967; Nielsen 1972; Bartlett 1983). The results of these evaluation studies have been tempered by the political process involved in finding a fair value determination and have resulted in an administrative fee based largely on political compromises that generally underestimate the value of public land grazing benefits.

Using an appropriate level of forage value or benefit is crucial in economic analysis because use of unsupported and unrealistic values casts doubt on the validity of the conclusions. Currently, there is considerable variation in the values used for planning and analysis purposes even within a single agency (USDA 1982). Brown (1984) notes there are numerous assumptions in any method of determining values, and "the value" probably does not exist. Viewing forage from a static concept serves the same purpose as the static value of income. If one believes prices are continuously fluctuating around a dynamic equilibrium due to supply and demand forces (Watson and Holman 1977).

Economic analysis of range improvement practices and comparison of alternative uses for rangeland require reasonable and appropriate estimates of the value of livestock grazing benefits. These estimates, however, differ greatly depending upon the assumptions and values used and the critical assumptions made. This paper will briefly discuss the most common approaches to valuing livestock grazing on public lands. The variability in results is highly questionable to allocate residual income to a single factor such as grazing forage (Gee 1983). Indeed, to arbitrarily price management and unpaid family labor at some prescribed level and then allocate remaining value to another factor seems highly questionable.

In practice, budgeting can be used to get some rapid first approximations of values and as a check on other methods. Because budgets require considerable data, many analysts rely on secondary sources for many items and supplement this with primary data. This tends to decrease accuracy of results.

Substitute Feed Method

Economic theory holds that if two factors are perfect substitutes for each other in a production process and the value of one is known, the value of the other in the process is set at the same level (Watson and Holman 1977). There have been attempts to value range forage by this approach (Roberts 1967; Bartlett 1983). In these studies, relatively high values were derived due to the strict assumptions of the model.

The substitute feed approach rests upon determining a price for the substitute, which is commonly hay because market prices are recorded. This price then must be adjusted for quality and differences, location, and other costs involved in using the substitute, and considerable judgment is required as well as some assumptions concerning the availability and feasibility of such a practice (Wagstaff 1983).

Market Comparisons

Several studies conclude that there is an established market for public range forage and that the value of forage can be determined through market analysis (Gardner 1962; Bartlett and others 1981; Bartlett 1983). Estimates of value are made by comparing the value in question to the value of other forage which similar items have been exchanged. The larger the number of market transactions and the more homogeneous the item, the more reliable the estimates will be. Range forage is location specific; livestock must be moved to use the forage. Also, certain ranges have climatic attributes that allow use only during a specific season.

If a range forage market does exist and public land forage is traded as described by Nielsen and Westergren (1970), Bartlett (1983), Gardner (1962), and Roberts (1967), then exchange price could be used to estimate value. The value used would be the exchange price and would be exchanged to compare transactions that are as similar as possible to the subject area.

The literature details two approaches to market comparisons. One approach uses sales of forage itself through contracts or leases with required adjustments. The other approach uses the capitalized value of federal grazing permit transfers between individuals. For an agency to use this method to determine value due to the fee being set at a level below the value of the forage to livestock owners. These permits are bought and sold even though they are not recognized as a vestige by the livestock agencies (Andrus and Berglund 1977; USDA and USD 1983). This estimated value plus the fee and nonfee costs will yield an estimate of the willingness to pay value of the forage.

Case Example

In 1978, the Oak Creek Range Management Project was established under an accelerated range management program spearheaded by the Forest Service (Pope and Wagstaff 1987). The project included 117,200 acres of the Fillmore District of Fishlake National Forest in central Utah. Economic analyses were to be completed for various practices and improvements. An integral part of these analyses was a reasonable estimate of the value of public rangeland forage for livestock grazing.

Eight estimates of AUM values on the Oak Creek Project Area are provided in table 1. These estimates have resulted from different studies using alternative methods.

Table 1: Annual unit month (AUM) value for the Oak Creek Range Management Area

<table>
<thead>
<tr>
<th>Method</th>
<th>AUM Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grazing fee from current formula (1983)</td>
<td>1.36</td>
</tr>
<tr>
<td>Grazing fee from current formula (1984)</td>
<td>1.94</td>
</tr>
<tr>
<td>Grazing fee from current formula (1985)</td>
<td>2.00</td>
</tr>
<tr>
<td>Grazing fee from current formula (1986)</td>
<td>19.00</td>
</tr>
<tr>
<td>Grazing fee from current formula (1987)</td>
<td>15.00</td>
</tr>
<tr>
<td>Grazing fee from current formula (1988)</td>
<td>16.00</td>
</tr>
<tr>
<td>Grazing fee from current formula (1989)</td>
<td>17.00</td>
</tr>
</tbody>
</table>

* See USDA and USD 1983: "Grazing Fee Review and Evaluation.

Average value per unit from table 1. Annualization rate equals interest rate of (1.23)^t. 1.23 = 0.1 + 1.08 = 1.18.

Estimate 1 is the grazing fee for 1980 established by the current forage formula. Because the indices upon which this fee is determined have not proven highly reliable, and political considerations have held the fee at levels different from those shown by the indexing, the fee as an estimate of full forage value for livestock production seems low. This estimated value is an average value and would be low as an estimate of additional forage value.

Estimate 2 comes from budget/linear programming. The figure is from an Economic Research Service (ERS) study using linear programming to estimate forage value (Gee 1983). The AUM value of $9.46 is basically the estimated residual income to the forage as determined by this approach. This value is an average value and is a reflection of the value of forage as a by-product because a panel of producers generated the coefficient for the budget, and they probably reflect a higher than average efficiency in livestock production.

Estimates 3 and 4 are based upon the substitute feed approach. This approach is highly questionable and results...
CONCLUSION

Evidently, estimates of value vary significantly depending upon the methodology and assumptions used. However, a reasonable estimate seems to be determined through market comparisons of the most likely substitute value. Such an estimate is based on what producers will pay, not what they hypothetically could or should pay.

This study suggests that a reasonable estimate of the market value of public range value in the Oak Creek area falls within the $4.50 to $6.50 range. Economics analysis of range improvements should consider the sensitivity of the analysis results to changes in market values.

The feasibility analysis of public range improvements will be most accurate if values derived from market transactions are used or they are most reflective of actual conditions. Range estimates from other methods could be used for a quick estimate, and then a sensitivity analysis can be used to show how much effort is justified in getting a more accurate estimate of the value of the fee and the linear programming studies could be used as high and low values for first estimates of range value.

In the case of a permits' value, with the exception of the value of hay as a substitute fee, economic analysis is required. The project costs per additional AUM of range foraged were produced quite high (see Pope and Wagstaff 1987).

REFERENCES


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Eight methods for estimating the value of an animal unit month of public rangeland grazing generated estimates applicable to the Oak Creek area of central Utah. Of the eight estimates, six bracketed the range of acceptable estimates. The price paid for leasing similar rangeland was considered the most accurate estimate.

KEYWORDS: forage value, AUM value, public grazing value