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Costs Incurred by Permittees in Grazing Cattle on Public and Private Rangeland in Eastern Oregon

by

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Oregon State University Extension Service

Introduction

Few issues associated with federally managed rangelands have generated as much interest and controversy as the determination of an appropriate user fee to levy upon livestock operators grazing their stock on public lands. Legislative efforts over the years have sought to identify the goals of federal land management, and thus, to identify the factors that should be relevant to the design of the fee structure. Administrative and academic considerations of the issue have concentrated on analyzing the production and the welfare implications of different fee levels and upon the technical details involved in designing a fee schedule appropriate to the legislative intent. Livestock production interests have sought to have a fee implemented that does not exceed the economic value of public land forage available for use in their ranch operations.

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* The authors are Public Lands Policy Assistant and Associate Professor and Extension Regional Resource Economist, respectively, in the Department of Agricultural and Resource Economics, Oregon State University. The results reported here were developed from survey data obtained under the auspices of a Federal Extension Project, "Federal Rangeland Management: Improving Citizen Understanding" for which Drs. Obermiller and Thomas E. Bedell of the Department of Rangeland Resources, Oregon State University, serve as co-leaders. The authors wish to acknowledge the contribution of Dr. Sherman Swanson who, while employed by the Oregon State University Extension Service, conducted the majority of the field work for the survey.

A recurring theme in the establishment of efficient, and equitable, federal grazing fees has been the differences, if any, in costs experienced by livestock operators who lease private, versus public, grazing land. Currently, the Forest Service, United States Department of Agriculture, and the Bureau of Land Management, United States Department of Interior, are conducting a review of the existing federal grazing fee formula pricing system. Recommendations relative to the retention, revision, and/or abandonment of that system are to be made to Congress by December 31, 1985. Separately, studies of the existing federal grazing fee system, its implications, and alternatives are being made by Colorado State University under a contract with the Forest Service and the Bureau of Land Management; by the United States Department of Agriculture's Economic Research Service (Animal Products Branch) at the request of the Forest Service and the Bureau of Land Management; and by Consolidated Management Services, Inc., under a contract with the Public Lands Council.

None of these studies, however, incorporate the collection of cost data for permittees and nonpermittees. The last such data, collected in the mid-1960s, could be updated using various price indices to provide answers to questions raised by livestock operators, and others, regarding cost differentials. However, it is questionable whether such updating methods, assuming the reliability of the original 1966 data set, would yield reasonably accurate measures of current forage utilization costs.

Consistent with these questions, in November 1982 the Public Lands Committee of the Oregon Cattlemen's Association requested the assistance of the Oregon State University Extension Service in obtaining recent data on forage utilization costs. That assistance resulted in a nonrandom survey

of cooperating Eastern Oregon permittees during the spring of 1983. Expenses incurred during the study were born completely by the "Federal Rangeland Management: Improving Citizen Understanding" project, a special needs effort funded through the Office of the Administrator, Extension Service, United States Department of Agriculture.

Two major objectives guided the Oregon State University Extension Service survey effort. First, it was desired to design and test a field questionnaire that could be efficiently used to collect forage utilization cost data in Oregon, and thereby in other western states. If such information could be successfully gathered, it could be used to meet the second objective of the study: to illustrate the comparative costs to permittees of using public as opposed to privately leased grazing land in various Eastern Oregon subregions. If both objectives could be achieved, consideration then could be given to the pursuit of a more rigorous and comprehensive study of the cash and noncash costs of forage utilization, under various ownerships and by both permittees and nonpermittees, in a larger geographic area.

Survey and Verification Procedures

During the spring of 1983, forage utilization cost information was collected from nearly one hundred rangeland livestock operators in Eastern Oregon. All of the interviewed operators held either a Forest Service permit or a Bureau of Land Management license, although many also leased other privately owned or publicly managed grazing land. The questionnaire used in the survey was designed to gather the information that would allow Oregon State University Extension Service economists to calculate the permittees' cash and noncash costs associated with grazing livestock on land under four ownership patterns, including lands managed (1) by the

Bureau of Land Management; (2) by the Forest Service; (3) by other governmental bodies; and (4) privately owned rangelands leased from other operators. Based on experience gained in conducting the survey, the questionnaire subsequently was revised in order to enhance the efficiency of data collection. The revised version of the questionnaire is reproduced in Appendix I.

Due to time and budget limitations, the survey was not designed to gather information from a random sample of Eastern Oregon ranchers. County agricultural extension agents were asked to compile lists of ten to fifteen ranchers in their areas who operated on federal grazing lands. Therefore, it is very important to ascribe the costs reported here only to the sample of ranchers interviewed. Average costs for all Eastern Oregon permittees can be inferred only from a random sample drawn from all permittees in Eastern Oregon. These cost estimates cannot be statistically applied to all Eastern Oregon permittees, or to all ranchers without reference to the holding of a permit or license.

In any survey in which the results may affect, or may be perceived to affect, the respondent's welfare, the possibility of "strategic bias" exists. While this possibility is of considerable concern in the valuation of public goods for which there is no market and for which "willingness to pay or sell" values are sought, it also may be relevant in the present instance [see, for example, Desvousger et al. 1983, and Schulze et al. 1981]. Since the results of the forage utilization cost survey could be perceived by ranchers as influencing the amount they would pay for public land forage, specifically the Federal grazing fee, it is possible that ranchers could strategically overstate the costs of utilizing public land forage supplies while understating the costs of utilizing private land forage supplies.

In an effort to minimize the possibility of strategic bias, and based on experience gained in similar survey efforts in the past, answers which seemed unduly high or low were questioned in the course of the interview both on the particular question of concern and on subsequent questions dealing with similar categories of costs. Further, in the coding of data, cost estimates which seemed unreasonable were discarded.

These procedures, as well as the survey results, suggest that bias in the reported results may not be a significant problem. However, this does not imply that further attempts to evaluate the extent of possible bias in the reported results were unwarranted. Similarly, if the study reported here were to be repeated elsewhere it would be important to provide cross-checks and in other ways control for overstatement or understatement of cash and noncash cost estimates provided by respondents.

Overview of Survey Results

Following data collection, the results were analyzed. Out of the 179 allotments and privately leased pastures for which data were gathered, 14 questionnaires were found to be unusable for various reasons.

Analysis was conducted on the data for the remaining 165 allotments.[1/] Since information on the noncash (as well as cash) components of grazing land use was collected a common means had to be developed to convert information such as family (unpaid) labor, horse use, and lost animals into dollar values. The assumptions underlying these conversions are presented in Appendix II.

1/ Here, and elsewhere in this report, the terms allotment and pasture are used interchangeably except when specific reference is made to privately owned or publicly managed rangelands.

The costs of using an allotment were converted to a dollar cost per permitted or licensed animal unit month (AUM). Eleven line items were included in the cost calculations, as described in Appendix II. These roughly correspond to turnout activities, gathering and take-off activities, management associated with the cattle while they are on the range, and maintenance of range improvements.

It was found that the average total costs of grazing were sufficiently similar for (1) all of the surveyed Forest Service areas, and (2) the private leases, to allow these two data sets to be grouped into one overall Forest Service average and one average for the private leases. However, the Bureau of Land Management (BLM) observations showed enough variation among the different areas of the state that it would have been inappropriate to lump all 78 BLM observations into one group. It subsequently was found that the BLM areas could be aggregated on statistical and (tentatively geographical) grounds into three groups: (1) Malheur County and one BLM observation obtained from a Grant County producer; (2) Baker County and the six observations from the eastside of the Cascades from Klamath County north to Crook County; and (3) Harney and Lake Counties.

The results of the analysis are reported in Table 1. There appears to be little difference in the average total cost figures observed for the Forest Service, the private leases, and for the BLM observations from the Baker County and Eastside Cascades group. In fact, there was discovered to be no basis to conclude that the costs per AUM among these groups were statistically different. In a statistical sense, however, the total costs per AUM were found to be significantly lower in the remaining two BLM areas: Malheur/Grant and Harney/Lake. As is discussed later, within some of the five statistically and geographically differentiated groups a great deal of variation was found in the average cost per AUM.

Table 1. Per AUM Total Costs and Costs by Activity in 1982 Dollars for Grazing on Bureau of Land Management, Forest Service, and Privately Leased Lands in Eastern Oregon.

Group / Activity[a/]	Bureau of Land Management									Forest Service n=64			Private Leases n=23		
	Malheur/Grant n=15			Baker/Eastside Cascade n=18			Harney/Lake n=45								
	Cost ($/AUM)	% of Total Cost	Std. Dev.	Cost ($/AUM)	% of Total Cost	Std. Dev.	Cost ($/AUM)	% of Total Cost	Std. Dev.[b/]	Cost ($/AUM)	% of Total Cost	Std. Dev.	Cost ($/AUM)	% of Total Cost	Std. Dev.
Turn-out	.54	6.8	.45	.86	4.9	.61	1.27	11.4	----	.99	6.2	1.02	1.18	8.4	1.59
Gathering and take-off	.81	10.2	.58	2.92	16.7	2.70	1.66	14.9	----	3.24	20.2	3.08	1.29	9.2	1.16
Management	1.15	14.5	.82	4.29	24.5	3.86	1.72	15.5	----	4.24	26.4	4.76	1.16	8.3	1.06
Maintenance	.49	6.2	.76	1.76	10.1	1.74	.75	6.7	----	1.82	11.3	2.15	.64	4.6	1.03
Meetings/paperwork	.48	6.1	.49	.53	3.0	.68	.18	1.6	----	.22	1.4	.31	.03	0.2	.09
Salt, feed, med.	.29	3.4	.22	.40	11.3	.71	.42	3.8	----	.32	2.0	.46	.35	2.5	.44
Death loss	2.06	26.0	.98	2.48	2.3	2.25	2.68	24.1	----	1.94	12.1	1.95	1.27	9.1	1.02
Other	.17	2.2	.30	1.98	14.2	4.93	.60	5.4	----	.62	3.9	2.28	.05	0.4	.14
Miscellaneous	.01	0.1	.05	.03	0.2	.07	.01	0.1	----	.02	0.1	.07	0.00	0.0	0.00
Association fees	.13	1.6	.37	.50	2.9	1.41	0.00	0.0	----	.80	5.0	1.20	0.00	0.0	0.00
License/lease	1.77	22.4	.20	1.78	10.2	.25	1.85	16.6	----	1.85	11.5	.05	8.06	57.5	5.14
TOTAL COST	*7.92*	*100.0*	*1.92*	*17.52*	*100.0*	*8.54*	*11.12*	*100.0*	*5.53*	*16.06*	*100.0*	*9.50*	*14.02*	*100.0*	*6.26*

a/ All activities are defined and described in Appendix II, Part II.

b/ Due to a computer space memory limitation, standard deviations could not be computed for the Harney/Lake permittee activity costs.

Another statistical tool was employed to test what factors were most influential in causing this variation within groups. It was found that approximately 23 percent of the variation in the total costs per AUM could be explained by four factors: (1) As the number of animal units in the lease or permit increased, the overall average costs declined. An increase of one animal resulted in a drop of slightly under one-half a cent in the average cost of using an AUM. (2) Increases in the length of the grazing season resulted in lower average costs. An additional week of grazing reduced the average utilization cost per AUM by about 19 cents. (3) Another influential factor was the distance of the allotment from the headquarters ranch. Each added mile in distance caused an increase in the average cost of using the AUM of approximately seven cents. (4) Geographical and land ownership considerations also exerted an influence on the forage utilization costs. As already pointed out, costs were significantly lower for BLM allotments in two of the areas: Harney/Lake and Malheur/Grant. The average utilization cost per AUM tended to be higher in the remaining BLM allotments (Baker County and Eastside Cascades), on Forest Service allotments, and on privately leased grazing land.

Data Collection

County agricultural extension agents in eight Eastern Oregon counties were asked to provide the authors with the names of ten to fifteen ranchers in their areas who held federal permits, although as noted earlier some of these operators also ran livestock on privately leased rangeland. Since budgetary considerations precluded random sampling, it was suggested to the agents that the identified ranchers should either keep accurate records or have fairly good recollections of the costs they encountered on their grazing lands. Although these qualities were later found to be far from

universal among the ranchers included in the survey, it must be stressed that the style of sampling was completely non-random. The ranchers in the survey were selected for certain characteristics and their inclusion was a function of the county agents' discretion. Therefore, any generalization of the results reported here to the entire population of Eastern Oregon permittees or ranchers is entirely inappropriate. The reported results can only be accurate for the surveyed ranchers: They may or may not be accurate representations of the cost characteristics of all Eastern Oregon permit- and lease-holding rangeland livestock operators.

Data collection began in February 1983 and was completed by the middle of April. Approximately 75 percent of the interviews were conducted by one field worker, with the remainder being completed by the senior author, one county agent, and two graduate students. Characteristics of the surveyed population are presented in Tables 2 and 3.

Following the data collection stage, the information on the completed questionnaires was coded and placed on computer files. Numerous assumptions had to be made to translate the nonmonetary costs associated with using the allotments into corresponding dollar values. For example, values had to be placed on family labor, horse use, and vehicle expenses. The assumptions used to derive these values are described in Appendix II.

Results

The costs of operating in an allotment or on leased range were separated into 11 categories. In broad terms, these categories correspond to turn-out at the beginning of the grazing period, gathering and moving the stock at the end of the season, and the management of the animals and maintenance of structural improvements on the allotment during the season. Average dollar costs on a per AUM basis, by land ownership classification,

Table 2. Sampling Information for 1983 Survey of Eastern Oregon Permittees' Cash and Noncash Forage Utilization Costs.

County or Area	Number of Ranchers Interviewed	Number of Allotments/Pastures for Which Data Were Collected							
		Total				Usable			
		BLM	USFS	Private	USF&WS[a/]	BLM	USFS	Private	USF&WS
Malheur	14	15	0	3	0	14	0	0	0
Baker	13	14	7	4	0	12	7	4	0
Grant	10	2	11	4	0	1	9	4	0
Harney	13	24	4	3	3	23	3	3	1
Lake	16	22	13	4	1	22	13	4	1
Northeastern Oregon (Wallowa, Union, Umatilla, & Morrow Counties)	10	0	12	6	0	0	12	5	0
Eastside Cascades	10	5	8	3	0	5	6	3	0
Crooked River National Grasslands (Gray Butte Grazing Association)	11	1	14	0	0	1	14	0	0
TOTAL	*97*	*83*	*69*	*27*	*4*	*78*	*64*	*23*	*2*

[a/] Fish and Wildlife Service, United States Department of Interior.

Table 3. Number of Animal Unit Months (AUMs) Included in the 1983 Survey of Eastern Oregon Permittees.

Ownership / County or Area	Bureau of Land Management	Forest Service	Private
Malheur	25,779	------	------
Baker	7,027	7,863	2,766
Grant	680	10,145	4,370
Harney	35,324	2,336	3,127
Lake	60,291	9,588	4,839
Northeastern Oregon	-------	15,366	3,959
Eastside Cascades	4,352	6,552	1,260
Crooked River National Grasslands	42	5,809	------
TOTAL	*133,495*	*57,659*	*20,318*

are presented in Tables 4a-4c.[2/] The standard deviations listed next to these average figures give an indication of the amount of variation that was present among the observed costs within each group.[3/]

Rather than dealing in detail with the small numbers of observations in each of the 22 different groups, analysis of variance was employed to determine if aggregation of the data across counties would be appropriate. Results of this analysis indicated that, for the cost observations on Forest Service as well as private leased lands, the differences among counties were not statistically significant. Therefore, the overall cost figures for all eight areas in which Forest Service allotments were encountered, and for the six areas containing private leases, can be considered representative of all the ranchers in the survey.

Differences in Average Total Costs Among Groups

Tests for the statistical equivalence of the average cost means over all of the BLM counties failed to exhibit the same similarities. Aggregation across all BLM counties therefore was unwarranted. Further tests on the BLM data did support grouping the observations into the following three categories: (1) Malheur and Grant Counties; (2) Baker County and the scattering of observations along the east slopes of the Cascades from Klamath County northward to Crook County; and (3) Harney and Lake Counties.

[2/] Groups containing only one observation are excluded from Tables 4a-4c to avoid the possible disclosure of privileged information. These observations are, however, included in the reported aggregation of results (Table 1).

[3/] The average costs reported in Tables 1 and 4a-4c are unweighted by permit size. It is a reasonable hypothesis that the size of the permit should influence forage utilization costs. Using the unweighted averages permitted explicit testing of the significance of this relationship, as subsequently discussed.

Table 4a. Per AUM Total Costs and Costs by Activity in 1983 Dollars of Grazing on Bureau of Land Management Lands in Eastern Oregon, by Region.

County or Area / Activity	Malheur n=14		Baker n=12		Harney n=23		Lake n=22		Eastside Cascades n=5	
	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.
Turn-out	.56	.44	.89	.73	1.06	1.12	1.49	1.95	.86	.08
Gathering and take-off	.83	.60	2.70	2.76	1.46	1.09	1.84	1.32	3.57	2.70
Management	1.08	.80	4.63	4.09	1.93	1.42	1.50	1.30	3.61	3.56
Maintenance	.40	.71	1.81	2.04	.78	.74	.72	1.11	1.49	.88
Meetings/paperwork	.52	.49	.65	.80	.19	.33	.17	.21	.35	.19
Salt, feed, med.	.24	.15	.50	.85	.41	.73	.43	.57	.20	.11
Death loss	2.15	.95	2.60	2.09	2.72	2.59	2.64	1.72	2.68	2.53
Other	.18	.31	2.81	5.86	.67	1.45	.53	1.15	.09	.18
Miscellaneous	.01	.05	.02	.06	.02	.04	0.00	0.00	.05	.09
Association fees	.14	.39	0.00	0.00	0.00	0.02	0.00	0.00	1.80	2.20
License/lease	1.82	.10	1.73	.30	1.84	.10	1.86	0.00	1.86	0.00
TOTAL COST	*7.95*	*1.99*	*18.35*	*9.99*	*11.08*	*5.39*	*11.17*	*5.55*	*16.55*	*3.90*

Table 4b. Per AUM Total Costs and Costs by Activity in 1982 Dollars of Grazing on Forest Service Lands in Eastern Oregon, by Region.

County or Area / Activity	Baker n=7		Grant n=9		Harney n=3		Lake n=13		Northeastern Oregon n=12		Eastside Cascades n=6		Crooked River National Grasslands n=14	
	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.
Turn-out	2.40	1.80	.83	.39	.71	.01	1.27	.86	.78	.62	.46	.47	.60	.69
Gathering and take-off	4.73	4.59	4.56	3.06	2.06	.65	4.70	2.96	3.07	2.87	2.17	1.50	1.14	1.00
Management	4.33	3.52	3.63	1.79	2.68	.63	3.90	4.43	6.33	6.53	1.75	.61	4.50	5.74
Maintenance	3.65	3.42	2.36	1.61	1.38	.51	1.57	1.96	2.12	2.34	1.65	.67	.71	1.22
Meetings/paperwork	.26	.30	.07	.08	.26	.16	.20	.22	.28	.33	.13	.06	.27	.47
Salt, feed, med.	.18	.04	.14	.12	.14	.09	.34	.29	.40	.49	.28	.08	.47	.78
Death loss	2.59	1.97	1.58	.97	1.32	.46	2.82	2.15	1.86	2.27	3.20	1.40	.71	1.38
Other	.28	.34	1.40	3.75	.56	.80	.33	.45	.37	1.03	.10	.13	1.02	3.55
Miscellaneous	.09	.18	.02	.05	0.00	.00	0.00	0.00	.01	.04	.03	.06	0.00	0.00
Association fees	0.00	0.00	.64	.92	.41	.58	0.00	0.00	.34	.64	0.00	0.00	2.85	.20
License/lease	1.86	0.00	1.79	.12	1.86	.00	1.86	0.00	1.86	0.00	1.86	0.00	1.86	0.00
TOTAL COST	*20.38*	*8.85*	*17.04*	*8.10*	*11.38*	*.69*	*17.00*	*10.23*	*17.42*	*12.64*	*11.62*	*3.23*	*14.12*	*7.95*

Table 4c. Per AUM Total Costs and Costs by Activity in 1982 Dollars of Grazing on Privately-Owned Leased Lands in Eastern Oregon, by Region.

County or Area / Activity	Baker n=4		Grant n=4		Harney n=3		Lake n=4		Northeastern Oregon n=5		Eastside Cascades n=3	
	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.	Cost ($/AUM)	Std. Dev.
Turn-out	.77	.35	1.77	1.87	2.70	3.15	.60	.37	.85	.57	.73	.21
Gathering and take-off	.93	.69	2.41	1.67	.45	.43	1.21	.59	1.26	1.26	1.23	.30
Management	.17	.17	.90	.52	.76	.12	2.03	1.43	1.79	1.08	1.03	.44
Maintenance	0.00	0.00	.08	.13	.81	.57	.54	.14	1.73	1.64	.39	.39
Meetings/paperwork	.11	.17	.03	.04	0.00	0.00	.04	.07	.01	.02	0.00	0.00
Salt, feed, med.	.30	.51	.52	.75	.10	.10	.38	.22	.40	.34	.28	.16
Death loss	.95	1.07	1.80	.82	2.54	.63	1.22	.82	.75	.64	.69	.82
Other	0.00	0.00	.12	.21	.03	.05	0.00	0.00	.10	.19	0.00	0.00
Miscellaneous	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Association fees	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
License/ lease	9.63	1.85	9.81	2.91	7.08	6.58	2.72	.40	11.27	6.69	6.38	1.49
TOTAL COST	*12.85*	*3.58*	*17.44*	*6.28*	*14.46*	*9.06*	*8.75*	*1.79*	*18.16*	*5.41*	*10.73*	*1.26*

Average costs for all five resultant groups (three BLM, one Forest Service, and one private) are as presented in Table 1. Analysis of variance tests were conducted to see if there were significant differences among these five groups in the average total costs of using Forest Service, private, or BLM grazing lands. The results showed no significant differences among the costs of grazing on privately leased land, on Forest Service land, and on the BLM allotments in the Baker/East Cascades group. However, costs were found to be significantly lower in the BLM allotments in Harney and Lake Counties and in Malheur County (including the one observation from the Grant County operator).

Differences in Average Costs by Cost Activity

Even with the similarities in the average total costs among three of the five groupings, the distributions of these costs by activity appear to vary. The greatest proportion of the per AUM cost of leased rangeland is attributable to the cost of the lease itself. Whereas the cost of the license on federal allotments is close to the $1.86 per AUM charged by the federal agencies in 1982 (reported values are slightly less than $1.86 because of exchange use of AUMs available to some permittees), the private lease cost was slightly higher than $8.00 per AUM. The major cost savings associated with private leases appear to occur in reduced death losses of stock, and in a lower requirement for lessee management of the animals and maintenance of structural improvements on the leased land.

Turn-out costs appear to be relatively low across all five groups. In many cases, turn-out required only the opening of gates or the driving of cattle a short distance from their last pasture. Gathering and take-off costs were generally much higher. For the 64 Forest Service observations, an average of about 20 percent of the total average cost was due to this

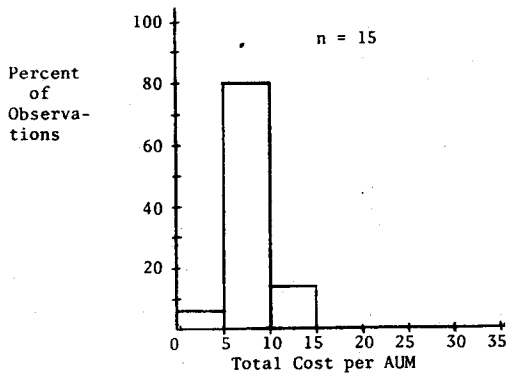
activity. This high cost could be a function of the terrain: Gathering livestock on forested, mountainous country typical of Forest Service allotments requires more effort than in less timbered pastures. Unfortunately, this hypothesis is untestable with the present data, as information on the physical characteristics of the allotments was not collected. However, terrain was mentioned as influencing the gathering effort by many of the interviewed Forest Service permittees.

In all of the groups except for the Malheur County area, cattle management costs were much higher on the federal rangeland than on the privately leased land. Average number of trips to the allotment during the grazing season, distance travelled to the allotment, and horse use were usually greater with the federal lands.

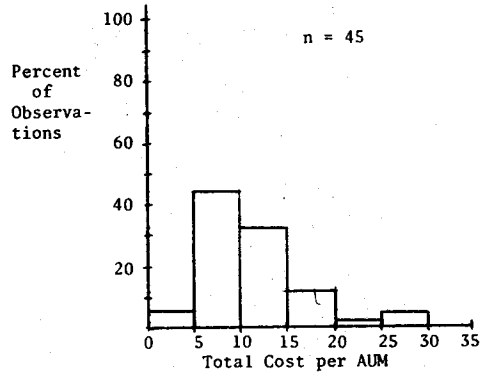
An issue of much concern to the livestock industry since the adoption of the BLM's rangeland improvement policy in the fall of 1982 has been the future cost to the permittees of maintaining structural improvements on their public land allotments. Unfortunately, no generalizations regarding comparative maintenance costs can be made from the present data. Maintenance costs on the Forest Service allotments appear higher than those associated with private lease arrangements. However, no clear distinctions appear with respect to the BLM observations. Maintenance costs are lowest on a per AUM basis in Malheur County, yet are comparable to the Forest Service maintenance costs in adjoining Baker County.

Distributions of Average Total Costs by Group

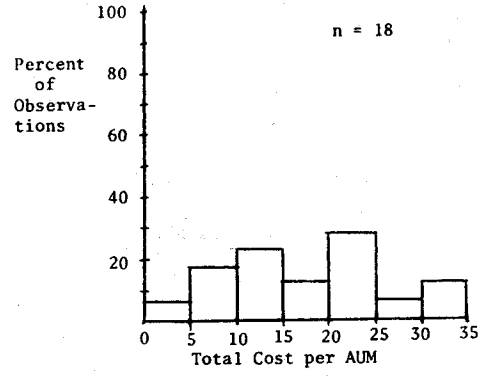
The individual observations on the average total cost per AUM within each of the five groups are depicted in Figures 1a-1e. The low standard deviation of the Malheur/Grant Counties observations is illustrated in Figure 1a. Twelve of the 15 observations are seen to lie between five and



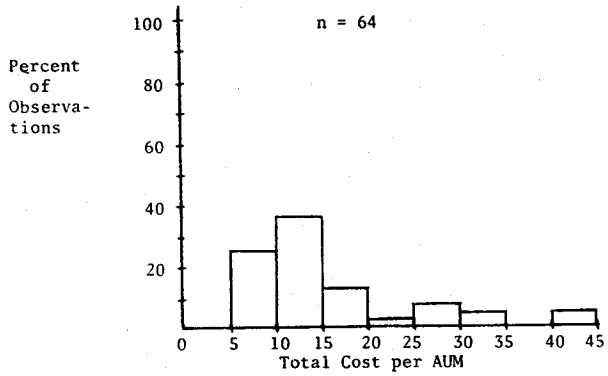
1a. Baker/Grant counties - BLM



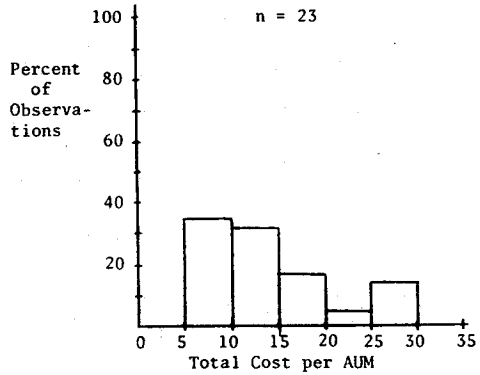
1b. Harney/Lake counties - BLM



1c. Baker/Eastside cascades - BLM



1d. Forest Service



1e. Private leases

Figure 1. Distribution of Observations on Total Costs per AUM in Eastern Oregon.

ten dollars per AUM on the BLM allotments. Harney and Lake County observations (Figure 1b) exhibit a broader cost spread, al through 34 of the 45 observations are between five and fifteen dollars. A very large amount of cost dispersion is seen in the observations from Baker County and the Eastside Cascades area (Figure 1c). The individual observations from these areas indicate that most of the high and low cost figures are from Baker County, while the values for the six Eastside Cascades observations are spread uniformly between ten and twenty-five dollars.

Individual observations on the Forest Service data indicate a skewness in the distribution of the costs, with 41 of the 64 observations lying between five and fifteen dollars per AUM (Figure 1d). However, there are a fair number of cases where much higher costs are faced. Eleven of the 64 observations were higher than 25 dollars per AUM.

The number of observations on the private leases fall fairly smoothly from the five to twenty-five dollars per AUM (Figure 1e). However, there is a jump at the high end of the range, with three observations occurring between 25 and 30 dollars.

Sources of Differences in Utilization Costs

An explanation was sought for the wide variation in costs seen in the observations. Among the factors which were felt to have an influence upon the cost per AUM were the size of the permit or lease, the number of animals in the allotment, the length of the grazing period, the distance of the allotment from the headquarters ranch, and the distance from the last pasture in which the cattle grazed.

Preliminary analysis of the data showed that the size of the permit in AUMs did not exert as great an influence on costs as did the number of

animals grazed (AUs).[4/] Results were further improved when the length of the permit was included as an explanatory variable. Similarly, even though the distance the animals had to travel from their last pasture did exert a statistically significant positive influence (at the 95 percent level of confidence) on the cost per AUM, the distance from the home ranch to the allotment was found to be an even more important factor.

Thus, the analysis examined the extent to which the observed variation in the costs per AUM could be explained by the number of animal units in the allotment or pasture (AUs), the length of the lease (WEEKS), and the distance from the headquarters ranch (DISTHQ). All of these independent variables were initially modified by the locational and ownership characteristics of the different groups. Upon testing, however, it was found that these characteristics had little significant impact on the influences of the explanatory variables. Therefore, these interaction effects were deleted from the model. Locational and ownership characteristics of the data were only retained to test their influence on the intercepts of the regression equations.

Results of the regression analysis are reported in Table 5. The dependent variable in all cases was the cost per AUM of the permit or of the lease. The constant term represents the intercept of the regression plane and is, in all cases, significantly different from zero. Since the interaction effects were deleted from the model, the coefficient on the three dependent variables are the same for all models (as are the associated t-values reported in parentheses). The following interpretations can be placed on the coefficients listed in Table 5.

[4/] Ordinary least squares (OLS) regression analyses were conducted on various combinations of these variables. In addition, dummy variables were introduced to account for the geographical and land ownership groupings in which the data were placed.

Table 5. Regression Results for Per AUM Total Cash and Noncash Forage Utilization Costs, in 1982 Dollars, Incurred by Permittees in Grazing on Bureau of Land Management, Forest Service, and Privately Leased Lands in Eastern Oregon and Eastern Oregon Subregions.

	Variable (T-Value in Parentheses)				Number of Observations
	Constant	AUs	WEEKS	DISTHQ	
	------Ordinary Least Squares Parameter Estimates---------				
Bureau of Land Management					
Malheur/Grant	12.4707 (4.665)	-.0034 (-2.054)	-.1861 (-2.359)	.0742 (3.015)	15
Harney/Lake	14.0879 (7.774)	-.0034	-.1861	.0742	18
Baker/Eastside Cascades	19.9420 (8.961)	-.0034	-.1861	.0742	45
Private Leases	15.7526 (7.548)	-.0034	-.1861	.0742	23
Forest Service	18.6093 (11.195)	-.0034	-.1861	.0742	64
	----------Weighted Least Squares Parameter Estimates----				
Forest Service	16.0890 (5.33)	-.0060 (1.659)	-.1792 (1.379)	.1495 (3.409)	64

(1) For the sample of 165 allotments and pastures included in this study, increasing the number of animal units in the allotment by one animal would cause a decrease in the cost per AUM of using that allotment by $0.0034 (or 0.34 cents);

(2) Similarly, the cost per AUM is inversely related to the length of the grazing season. A one week increase in the permit reduces the cost per AUM by $0.1861 (or about 19 cents);

(3) The distance from the headquarters ranch exerts a positive influence upon costs. If the other variables are held constant, each additional mile of distance between the ranch and the allotment adds $0.0742 (or about 7 cents) to the cost per AUM.

The results reported above do not accurately describe the cost relationships on Forest Service allotments due to a statistical problem that is commonly found with data of the sort collected here. That problem (heteroskedasticity) was overcome by applying a more advanced form of analysis (weighted least squares) to the Forest Service data.[5/] Coefficients derived using this alternative approach also are reported in Table 5.

Since the data were transformed by this procedure, direct comparison of the Forest Service coefficients with those obtained for the remaining four groups are not possible. However, it is seen that the same general relationships hold. Costs per AUM decline with increases in the number of animal units (at the 90 percent level of confidence) and increase with the distance from the home ranch. Although not significant, there does appear to be a slight negative relationship between the length of the grazing season and the average total costs.

5/ Each observation is multiplied by the square root of the number of animal units associated with that observation.

The results presented above may be summarized as follows. Total costs per AUM for the 165 pastures and allotments in this study were influenced by three factors: (1) Costs tended to decline with increases in the number of animals in the allotment and/or (2) with increases in the length of the grazing season; and (3) increasing distance from the home ranch increased the costs associated with using these allotments and pastures.

Conclusions

As has been repeatedly noted, the results of this study should not be generalized to all Eastern Oregon permittees, much less to permittees in other western states. However, the results do suggest avenues for further inquiry. Factors have been identified that appear to influence cash and noncash forage utilization costs, and these costs have been found to vary, on either an activity or an average total cost basis, among certain areas in Eastern Oregon. To the extent that these tendencies may be confirmed through more rigorous methods of data collection and analysis, cause for questioning either the efficiency or the equity of a single fee uniformly charged all permittees may be demonstrated to exist. These survey results offer no firm evidence to support the contention that the surveyed permittees uniformly enjoy appreciably lower costs of forage utilization on their federally managed allotments than they do on their leased, privately owned rangelands.

References

Desvousger, William H., V. Kerry Smith, and Matthew P. McGivney, "A Comparison of Alternative Approaches for Estimating Recreation and Related Benefits of Water Quality Improvements." U.S. Environmental Protection Agency, Office of Policy Analysis. EPA-230-05-83-001. March 1983.

Schulze, W.D., R.C. d'Arge, and D.S. Brookshire. "Valuing Environmental Commodities: Some Recent Experiments," Land Economics, Vol. 57, No. 2. May 1982, pp. 151-173.

APPENDIX I

Revised Version of the Survey Questionnaire Used in the Eastern Oregon Forage Utilization Cost Study

RANGELAND GRAZING COST SURVEY

1983

This survey is being conducted by _____ and the Federal Rangeland Management Project in order to accurately determine the total cash and non-cash costs of running livestock on publicly owned or privately owned rangeland. The intended purpose of the information will be to update the costs of public and private grazing for western livestock producers that were originally computed for the 1966 grazing fee study. The results of this survey will provide federal decision makers with an additional source of information in their determination of future grazing fee levels. Please be assured that any information you give will be strictly confidential.

A. Allotment Characteristics

1a. State	b. County	c. Operator Code No.	d. Allotment/Pasture Code No.
_____	_____	_____	_____

2. Allotment/pasture ownership _____
(1=BLM, 2=Forest Service, 3=Private, 4=Other (specify _____))

3. Total actual 1982 use (AUMs) _____

4. Cost of permit or lease (excluding Association fees) _____

5. Type of livestock _____

6. Dates of use (month/day to month/day) _____

7. Is this a common or an individual allotment/pasture? _____
(1=common, 2=individual)

8. How far is this allotment from the headquarters ranch? _____

B. Transportation of Livestock to This Allotment

1. How far did the livestock have to be moved from their previous location to the current allotment? _____

2. Were these livestock moved to this allotment from another allotment for which a questionnaire has been completed (yes or no)? _____

   If yes, what is the other allotment's code number? *(Information to be supplied by the interviewer.)* _____

3. How were the livestock transported to this allotment? _____

   Enter the percentage of the livestock moved from their prior location to this allotment by the following modes of transportation:

   Hired trucks _____% Owned trucks _____% Trailed _____% Other (Specify _____) _____%

4. If hired trucks were used what was your total cost? _____

5. Resources used in transporting stock to this allotment.

   a. Labor

	Number of people	Total Amount of Time (per person)
Owner/Operator		
Family members		
Regular hired labor		
Day labor		

   b. Number of horses used in transporting stock to the allotment. _____

c. Number and types of owned vehicles used:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

C. Allotment Management Costs

The purpose of the following questions is to determine the total amount of time and money expended in trips to and from the allotment during the grazing season.

Questions in this section are separated into four major classes of activities associated with allotment management: (1) herding and pasture moves; (2) maintenance of facilities; (3) watering of stock; and (4) other routine activities.

Be sure to keep these categories distinct in order to prevent double-counting.

I. Herding and/or Pasture Moves

The following questions should be asked if the stock were herded and/or moved from pasture to pasture while on this allotment.

1a. Labor used in herding/pasture moves.

	Number of People	Total Amount of Time (per person)
Owner/operator		
Family labor		
Regular hired labor		
Day labor		

1b. Number of horses used _____

1c. Number and types of vehicles used in herding/pasture moves:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

II. Maintenance

The following questions refer to resources used for maintenance of improvements in the allotment/pasture.

2a. Labor used for maintenance.

	Number of People	Total Amount of Time (per person)
Owner/operator		
Family labor		
Regular hired labor		
Day labor		

2b. Percentage of maintenance trips in which horses were used? _____%

2c. Number of horses used. _____

2d. Number and types of owned vehicles used on maintenance trips:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

2e. The following items should include money costs encountered in 1982 for maintenance of the facilities in the allotment.

Facility	Parts ($)	Other (e.g., rented equipment, contract work, etc.)
Water Developments		
Fences		
Cattleguards		
Other: _____ _____		

III. Watering Livestock

If extensive resources are not employed in watering livestock, skip to Section IV.

3a. Labor used in watering stock:

	Number of People	Total Amount of Time (per person)
Owner/operator		
Family labor		
Regular hired labor		
Day labor		

3b. Percentage of watering trips in which horses were used? _____ %

3c. Number of horses used _____

3d. Number and types of vehicles used for watering stock:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

3e. Other costs associated with watering stock (e.g., pumping costs, hired water hauling, etc.) _____

IV. Routine Trips

The next set of questions refer to other cash and noncash costs of using the allotment. Be careful not to double-count the labor time, vehicle mileage, or cash costs already entered under herding, maintenance, or water hauling activities.

Ask either 4a or 4b:

4a. Number of trips made to this allotment during the 1982 grazing season (not including trips for maintenance and/or hauling) _____

4b. Average number of trips per week to the allotment (not including trips for maintenance and/or herding) _____

4c. Percentage of total number of these trips in which horses were used? _____%

i) Average number of horses used on these trips _____

Trip Characteristics.

5a. Average number of hours per trip on trips with no riding. _____

5b. Average number of hours per trip on trips with riding. _____

6. Average number of people on these trips:

	On Trips With No Riding	On Trips With Riding
Owner/operator		
Family members		
Regular hired labor		
Day labor		

7. Vehicle use on these trips:

Vehicle Type (enter)	Number of Vehicles Used	Average Roundtrip Mileage	Percentage of Trips in Which This Vehicle Type is Used
1.			
2.			
3.			
4.			
5.			

8. What is the approximate percentage of the total time spent on the allotment during the year spent in salting and feeding livestock? _____ %

Animal Management Items in This Allotment

9. Average cash expenditures for:

   a. Salt _____

   b. Feed/supplements _____

   c. Association fees (do not include cost of permit) _____

   d. Veterinary/medicines _____

10. Average number of animals lost through death or disappearance in this allotment:

   a. Cows _____

   b. Yearling heifers _____

   c. Calves _____

   d. Yearlings _____

   e. Bulls _____

   f. Rams _____

   g. Ewes _____

   h. Lambs _____

11. Other costs encountered in this allotment during 1982 (e.g., flying the allotment, vandalism, chasing stock due to gates being left open, paperwork, meetings, etc.).

Item	Cash Costs	Vehicle Mileage	Total Labor Time			
			Owner/ operator	Family members	Regular Hired labor	Day labor
1.						
2.						
3.						
4.						
5.						

D. Gathering and Take-off

The following questions refer to resources employed for gathering and removing stock from this allotment.

1a. Labor used in gathering stock:

	Number of People	Total Amount of Time Spent Gathering Stock (per person)
Owner/operator		
Family members		
Regular hired labor		
Day labor		

1b. Number of horses used in gathering livestock. _____

1c. Number and types of vehicles used in gathering:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

2. How were the livestock moved to their next pasture?

Hired trucks _____%, Owned trucks _____%, Trailed _____%, Other (specify _____) _____%

3. If hired trucks were used, what was your total cost? _____

4a. Labor used in moving stock:

	Number of People	Total Amount of Time (per person)
Owner/operator		
Family members		
Regular hired labor		
Day labor		

4b. Number of horses used in moving stock. _____

4c. Number and types of vehicles used:

Vehicle Type (enter)	Number of Vehicles Used	Estimated Total Miles Driven
1.		
2.		
3.		
4.		
5.		

E. Range Developments/Capital Improvements

1. Have you made any investments in water developments, range developments, fencing, roads, corrals or any other development on this allotment since 1962? _____

If NO ( ), go to Section F

If YES ( ), complete worksheet below.

2. Worksheet for Range Developments/Capital Improvements

Type of Development	New Developments Made By You Since 1962					
	CODE	Year Developed (Year)	Number	Miles=1 Acres=2 (Code)	Dollars you invested (including hired labor costs	Hours of unpaid labor incl. operator & other unpaid labor
	(a)	(b)	(c)	(d)	(e)	(f)
Development Code Wells..... 01 Springs..... 02 Ponds..... 03 Fence..... 04 Roads..... 05 Corrals..... 06 Oilers..... 07 Dipping Vats..... 08 Seeding..... 09 Spraying..... 10 Other (Specify in Notes)... 11	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					
	C __					

F. Labor Cost

This final question will be used to determine the cost of labor used in operating in this allotment.

	Paid by the: 1=unpaid 2=month 3=week 4=day 5=hour	Wage Rate Per Unit of Time	Approximate Monthly Cost/ Value to the Ranch for Social Security, Unemployment Insurance, Fringe Benefits, etc.)
Owner/operator			
Family members			
Regular hired labor			
Day labor			

APPENDIX II

Procedures Used in Estimating Nonmonetary Forage Utilization Costs and Description of Cost Activities

I. Assumptions Used in Deriving Monetary Values for Noncash Costs

A. Family (unpaid) labor.

At least two approaches are possible for calculating the cash value of family labor. One is to determine its marginal contribution to ranch net revenues through mathematical programming models. The second approach is to use the average cost of hired labor as a conservative (i.e., low) estimate of the value of family labor.

Development of a programming model was felt to be beyond the scope and the needs of the present study. Therefore, average hired labor costs were calculated from 102 allotment observations for which hired labor data were available. This figure, which included wages, unemployment insurance, and, where applicable, fringe benefits, averages $49.52 per ten-hour day. By applying the same per day value to a day of work provided by a family member, the implicit assumption is being made that the value of family labor is at least as great as that of hired labor. In this respect, the $49.52 figure probably underestimates family labor costs.

To test the sensitivity of the results to the assumed value of family labor, an alternative analysis was conducted using a family labor wage rate of $74.28 per ten-hour day (a fifty percent increase over the initially assumed $49.52 labor cost figure). The results of this alternative analysis are summarized in Table A1.

In essence, the higher values for unpaid family labor increase the total average costs of using allotments relative to private leases because, in this study, relatively more time was found to be spent by unpaid family members in activities associated with livestock on allotments. While a 50

Table A1: Sensitivity of the Per AUM Total Costs to a Fifty Percent Increase in the Value of Unpaid Family Labor in 1982 Dollars for Grazing on Bureau of Land Management, Forest Service, and Privately Leased Lands in Eastern Oregon.

	Bureau of Land Management			Forest Service n=64	Private leases n=23
	Malheur/ Grant n=15	Baker/ Eastside Cascades n=18	Harney/ Lake n=45		
Cost/AUM at $49.52/ day	$ 7.92	$ 17.52	$ 11.12	$ 16.06	$ 14.02
Cost/AUM at $74.28/ day	$ 8.96	$ 20.76	$ 12.02	$ 18.07	$ 14.49
Percentage Increase	$ 13.1%	$ 18.5%	$ 8.1%	$ 12.5%	$ 3.4%

percent increase in family labor costs increases average total costs per AUM for private leases by only 3.4 percent (from $14.02 to $14.49), average costs for the four public land using groups increase by 8.1 percent (Harney/Lake) to 18.5 percent (Baker/Eastside Cascades).

In a statistical sense, increases in unpaid family labor wage rates blurs the significance of the distinction between average total costs per AUM for Bureau of Land Management permittees in Malheur/Grant and Harney/Lake Counties. Costs no longer are significantly different, and they now average $11.26 per AUM for the combined groups. However, the remaining three groups (Baker/Eastside Cascades, Forest Service, and Private Leases) remain statistically distinct.

B. Horse cost.

In the early stages of assessing the economic impacts resulting from the creation of wilderness areas on public lands, a Bureau of Land Management staff economist in the Oregon State Office calculated the cost of maintaining horses. Data used in the derivation of these costs were gathered through interviews with a professor in the Oregon State University Animal Science Department, with three Eastern Oregon county extension agents, and with one professional packer in northeastern Oregon. Based on a $1,000 purchase price, a $450 salvage value, a ten year useful life, and $750 a year in operating costs, the annual expense was determined to be $805. A conservative cost estimate was obtained by dividing this figure by 365 to get a cost of $2.20 per day.

A liberal estimate of the number of horses required during the grazing seasons was used to offset this conservative cost per horse-day figure. It was usually observed during the interviews that three or four animals were required per person for most management activities. Therefore, information

on the total number of horses involved in the activity was collected, with each horse-day valued at the $2.20 figure.

C. Death loss.

Animals lost through death or disappearance were valued as follows:

(1) Calves were valued at the price received per weaned animal. A simple average was used of the value of a steer calf (weighing 425 pounds and worth $65/cwt) and of a heifer calf (400 pounds at $55/cwt), or a value of $247.50.

(2) Brood cows were valued at the sales revenue foregone from holding a replacement heifer to take her place, or $300.

(3) Bulls were assumed to cost $1,000, provide four years of service, and bring $500 as a cull animal. Loss was assumed to occur at the midpoint of their productive lives (or after two years). The loss to the rancher, thus, was assumed to be $602.20, which is the value of the final two years of discounted benefits to the rancher from the bull's use and the foregone revenue from selling the bull for slaughter. A fourteen percent interest rate was assumed.

D. Vehicle mileage costs.

Vehicle mileage costs were assumed to be 37 cents/mile for pickups, 55 cents/mile for pickups with a gooseneck trailer, $1.00/mile for two ton or bigger stock trucks, and $1.90 per loaded mile for a semi-trailer rigs. The last figure was based on commercial hauling rates. The assumptions outlined in the following table were used to derive the other three cost estimates:

Table A2. Assumptions Used in Estimating Vehicle Mileage Costs for the Calculation of Per AUM Cash and Noncash Utilization Costs of Grazing on Lands in Eastern Oregon.

Item \ Vehicle Type	Pick-up	Pick-up with trailer	Stock truck
New price	$10,000	$13,500	$20,000
Salvage	$ 2,500	$ 3,300	$ 3,000
Miles/year	10,000	10,000	5,000
Years of use	6	6	10
Fuel consumption (mpg)	10	6	6
Fuel cost ($/gallon)	$ 1.20	$ 1.20	$ 1.18
Annual interest rate	14%	14%	14%
Annual tax/license	$ 10	$ 15	$ 50
Annual insurance cost	$ 80	$ 90	$140
Tire cost	$320	$680	$ 1,500
Miles on set of tires	25,000	20,000	25,500
Annual maintenance	$150	$176	$350
Total annual cost	$ 3,693	$ 5,496	$ 5,133
Cost/mile	$.37	$.55	$1.03
Fixed cost/mile	$.22	$.30	$.70
Variable cost/mile	$.15	$.25	$3.3

II. Components of the Individual Cost

Items Used in This Report

A. Turn-out.

Activities here involved transporting the animals to the allotment by trailing or by trucking.

B. Gathering and take-off.

These costs included rounding the animals together and moving them off of the allotment. If the stock were moved to deeded lands the full cost of transportation was assigned to this allotment; otherwise, the costs were allocated between this and the subsequent pasture on a proportional basis.

C. Management.

Included here were the routine trips made to the allotment during the season as well as any range-rider expenses. Pasture moves were also included in this category.

D. Maintenance.

Maintenance and operating expenses included the cash cost of parts, generator and pump fuels and lubricants, contract labor and equipment, as well as ranch labor costs and vehicle expenses.

E. Meetings and paperwork.

This cost category included meetings held with the federal agencies or the private land-holders, necessary paperwork, and office costs such as supplies and telephone bills.

F. Salt, feed and medicine.

The actual costs of these items were included. Distribution or application of the items was included as a management expense.

G. Death loss.

Death loss costs were based on the average number of animals lost in the allotment during the grazing seasons.

H. Other.

This was a broad category, including those activities that seemed specific to a few allotments. The category included, among other things, flying costs, fixing improvements damaged through vandalism, hauling water, capital improvements made in the allotment, and chasing stock due to gates being left open.

I. Miscellaneous.

This was a residual category, and included those items that didn't seem to fit anywhere else, such as fixing dinner for friends who helped work in the allotment.

J. Association fees.

If the permittee operated in a grazing association, the cost of belonging to the association was included here.

K. License/Lease.

This category included the lease cost on privately owned land. These leases generally were charged on a head-month basis, though a few cases were observed where the cost was based on weight-gain. In the case of the federal lands, this cost was the $1.86 per AUM charged by the agencies during the 1982 grazing season. Variation from the $1.86 reported in the tables was usually due to those cases where the permittee was granted exchange-of-use privileges within the allotment.

II. Components of the Individual Cost Items Used in This Report

A. Turn-out.

Activities here involved transporting the animals to the allotment by trailing or by trucking.

B. Gathering and take-off.

These costs included rounding the animals together and moving them off of the allotment. If the stock were moved to deeded lands the full cost of transportation was assigned to this allotment; otherwise, the costs were allocated between this and the subsequent pasture on a proportional basis.

C. Management.

Included here were the routine trips made to the allotment during the season as well as any range-rider expenses. Pasture moves were also included in this category.

D. Maintenance.

Maintenance and operating expenses included the cash cost of parts, generator and pump fuels and lubricants, contract labor and equipment, as well as ranch labor costs and vehicle expenses.

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This cost category included meetings held with the federal agencies or the private land-holders, necessary paperwork, and office costs such as supplies and telephone bills.

F. Salt, feed and medicine.

The actual costs of these items were included. Distribution or application of the items was included as a management expense.

G. Death loss.

Death loss costs were based on the average number of animals lost in the allotment during the grazing seasons.

H. Other.

This was a broad category, including those activities that seemed specific to a few allotments. The category included, among other things, flying costs, fixing improvements damaged through vandalism, hauling water, capital improvements made in the allotment, and chasing stock due to gates being left open.

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