

# The Economic Importance of Livestock Grazing on BLM Land in Fremont County Wyoming



David T. Taylor, Roger H. Coupal, Thomas Foulke, and James G. Thompson

University of Wyoming Department of Agricultural and Applied Economics

October, 2004

## Introduction

Eighty-six percent of the nearly 6 million acres of Fremont County is publicly owned. The Bureau of Land Management (BLM) manages approximately 2 million acres of land in Fremont County. Historically, most of this land has been grazed by cattle and sheep under the BLM administered permit system. Recently, the system has received additional scrutiny as drought, rural residential development, and environmental concerns have increased public awareness. Some environmental and recreational groups have called for the removal of grazing animals from public lands. This report analyzes the economic impact of a reduction of grazing on BLM land in Fremont County, Wyoming. It is comprised of two parts. Part I analyzes firm level impacts of grazing reductions, that is, how profitability at the ranch level might be affected by a reduction in BLM grazing. Part II analyzes regional level impacts on jobs and income at the county level.

## Part I: FIRM LEVEL IMPACTS OF BLM GRAZING REDUCTIONS

The following analysis uses a representative model cattle ranch for Fremont County, Wyoming to estimate ranch-level impacts in the county. The ranch is modeled to represent an average size operation in Fremont County. This chapter has three sections: A description of a representative ranch, a summary of the revenues and costs from this representative ranch based upon the associated enterprise budget developed for Fremont County, and an analysis of the firm level impacts associated with a change in BLM grazing availability. The analysis uses a linear programming model to evaluate 25 percent, 50 percent and 100 percent reductions in grazing resources on BLM land.

### Section I: A brief description of a representative ranch in Fremont County

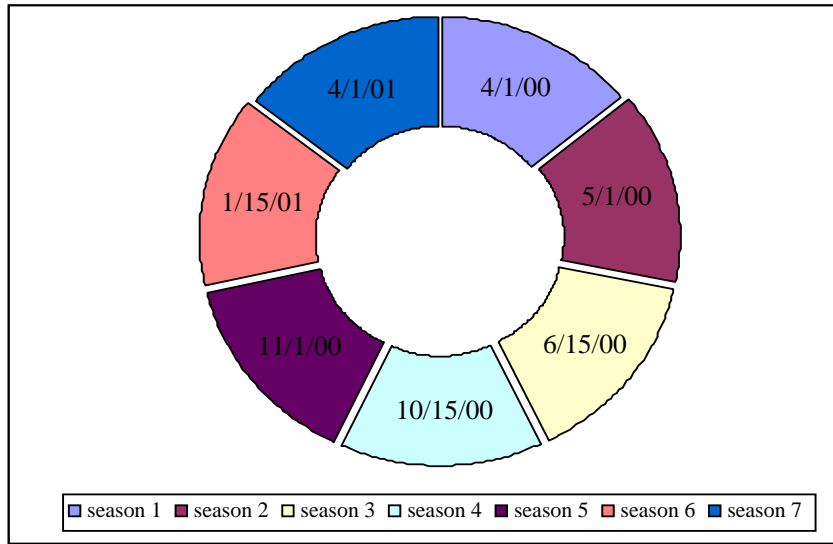
The representative ranch in this analysis is considered a median to large ranch for the county and runs 600 head of cattle. Our study chose this size after interviews with producers in the region that identified 600 cows as a typical size ranch that would require full time commitment by the operator. Secondary income or part-time ranching is not considered because of the complexity surrounding operator decisions to shift efforts into or away from ranching and another source of income. Forage is provided by BLM grazing leases (federal lands), a small state land lease, private leases and deeded grazing land. Forage resources are summarized in Table 1.

**Table 1.** Forage resources for a representative Fremont County cattle ranch.

Land Type	AUMs
State	538
BLM	3,765
Private leasing	500
Deeded range	1,076
Grass hay (tons)	793

Relatively little summer grazing is available on private land in the county since much of the land base is dedicated to raising hay for winter feed. The model breaks feeding time requirements into six seasons (Figure 2). In each seasonal category there is a different mix of forage type available. Purchased hay is provided as supplemental feed (Table 2).

**Figure 1.** Seasonal classification of forage availability, Fremont County, Wyoming.



**Table 2.** Seasonal range availability, representative model ranch, Fremont County, Wyoming.

	season 1	season 2	season 3	season 4	season 5	season 6	season 7
Beginning date	4/1/00	5/1/00	6/15/00	10/15/00	11/1/00	1/15/01	4/1/01
State lands	P	A	A	A		P	P
BLM	P	A	A	A		P	P
Private lease	P	A	A	A	A	P	P
Deeded range	P	A	A	A	A	P	P

(A) available feed (P) purchased feed.

**Table 3.** Animal unit equivalents for a representative ranch in Fremont County, Wyoming.

	season 1	season 2	season 3	season 4	season 5	season 6
Brood cow	1	1	1	1	1	1
Sell brood cow	1	1	1	1		
buybcow	1	1	1	1	1	1
cullcow	1	1	1	1		
bull	1.25	1.25	1.25	1.25	1.25	1.25
horse	1.25	1.25	1.25	1.25	1.25	1.25
scalf				0.5		
hcalf				0.5		
purscalf	0.5	0.5	0.75			
purhcalf	0.5	0.5	0.75			
syear				0.5	0.5	0.5
hyear				0.5	0.5	0.5
rephcalf				0.5	0.5	0.5
rephyear				0.5	0.5	0.5

Animal use equivalents are listed in Table 3. An AUE is simply an adjustment from AUM for comparison across animal classes and seasons. Brood cows need one AUE per season. Selling

off a brood cow occurs at the end of season 4 negating the feed requirement for seasons 5 and 6. Cull cows are handled in a similar fashion. Bulls and horses have a higher feed requirement (1.25 AUE) and are kept year around.

## **Section II: 600 Head Livestock Enterprise Budget**

*The following section was prepared for Fremont County Cooperative Extension by: Thomas Foulke, Ron Cunningham, Brett Moline, Tex Taylor, and Jim Thompson<sup>1</sup>*

The budget tables are included in Appendix A of this report.

### **Land**

The land base for this budget assumes that during the year, the operation will utilize 70 percent BLM land, 20 percent private land and 10 percent state land. Cattle are turned out on commingled BLM/private/state land mid-May and allowed to graze until mid-October. After gathering, sorting and culling, the herd is trucked to graze on crop aftermath, (typically corn, barley or hay stubble) through December and start on feed the beginning of January.

The private land requirement amounts to about 3,369 acres, which can be further broken down into about 2,289 acres of rangeland and 1,080 acres of cropland with the balance being ranchstead, roads and waste. This budget assumes that the rancher owns the rangeland but rents the aftermath land for the two months it is grazed. Therefore, it is assumed that the operator pays taxes and interest on the 3,369 owned acres.

### **Labor**

Labor is provided by the owner/operator and one hired man and is valued at \$7.00 per hour. The owner is assumed to work half-time in the operation and the hired man, full-time. It is understood that some of these hours could be substituted for by additional hired and/or family labor. Additionally, even if the operator is unpaid, this value can be looked at as the opportunity cost for the operator's time.

### **Capital**

Interest on operating capital does not show up in this budget since the returns from livestock sales are sufficient to meet cash flow requirements throughout the year. A nominal interest rate of 8.75 percent interest rate was applied to livestock, machinery and buildings. Owned land resources are charged an opportunity cost of 6 percent. The authors realize this is not always the cost structure that producers face. But regardless of the source, there is a cost to using capital, even one's own. Prices for interest rates and operating inputs are as of April 2001. Cattle sale prices are five-year averages of eastern Wyoming, western Nebraska (1996-2000).

### **Seasonal Operations**

This budget is only intended to be a guide that estimates typical practices in Fremont County as outlined by our panel of ranchers. The budget therefore necessarily makes some assumptions that will not fit all operations in the county.

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<sup>1</sup>This enterprise budget was developed in cooperation with a panel of local ranchers for a representative large cow-calf operation in Fremont County, Wyoming. The costs and returns presented here are considered typical for an enterprise of this size in the county as of April 2001.

Starting in January, a typical ranch of this size in Fremont County will be feeding alfalfa hay supplemented by some corn and/or silage. Many ranchers will have been backgrounding steers and heifer calves for sale in mid-January since the previous November. Feeding of the herd continues until about the first of April. Calving season, depending on the operator's preference will have been from mid to late February through mid March.

Cattle are turned out in early April on deeded ground after branding and vaccination. Trucking to summer pasture occurs about the first of May. The federal government owns a significant portion of Fremont County with the majority (2,000,000 acres) under control of the Bureau of Land Management (BLM). This budget assumes that summer pasture consists of commingled 70 percent BLM, 20 percent private land and 10 percent state lease. Cattle are trucked 45 miles to grass and the budget accounts for additional trucking costs due to weight gain on calves for the return trip in the fall.

Cattle are removed from summer pasture in mid to late October. Sorting, culling and pregnancy testing occurs at this time. Culls and open yearlings are sold immediately. Calves are separated from cows and weaned.

### **Summary**

This enterprise budget represents the economic costs and returns for a typical large (600 cows) cow-calf operation in Fremont County, Wyoming. Gross receipts from the operation totaled \$276,934 or \$462 per head. Operating costs were \$161,362, leaving income above operating costs of \$115,572 or \$193 per head. Ownership or fixed costs represent the costs incurred by the rancher as part of doing business and include land costs, depreciation and long-term interest on machinery, buildings and breeding livestock. Fixed costs in the budget amounted to \$85,691 or \$412 per head. Total costs (operating plus ownership costs) were \$247,053 or \$412 per head. Returns to capital, risk and management are the difference between gross receipts and total costs. This amounted to \$29,881 or \$50 per head.

### **Section III: Representative Ranch LP model**

To evaluate impacts of changes in BLM grazing resources we developed a linear programming model of the representative ranch based upon the resources and economic flows presented above. The model was developed using GAMS (General Algebraic Modeling System) software. The model was originally developed by Dr. Larry Van Tassel of the University of Idaho for the W-192 regional research project and was adapted by the authors for use in Fremont County. The model allows evaluation of net returns maximizing mixes of production given various BLM forage availability assumptions. Components of the model are summarized below.

### **Production and Revenues**

Production goals consist of balancing cattle production with hay production. Hay can be sold on the market or as feed in the production of cattle. Production is constrained by seasonal restrictions and forage resources described in Section I. Cattle prices for the forty year period are calculated using a Monte Carlo simulation model and based upon Van Tassel, et al. These prices mimic the cattle cycle through the 40-year model run.

## **Enterprise Costs**

Enterprise costs include production costs from the budget described in Section II and a fixed household expenditure allowance. Unlike cattle prices, input prices are assumed to remain constant and are not modeled as stochastic. Operating costs include crop production costs and animal costs. Household expenditures are simply a fixed amount every year. Household expenditures are fixed in the model at \$24,000 per year. Off farm income is set the same as household expenditures so as to offset this value and show the profitability of the ranch enterprise.

## **Resource Constraints**

The primary resource constraint modeled here is land or forage shares. The operation depends upon a mix of private and public forage sources described in Section I. Seasonality issues limit the ability to use some of those resources during some times of the year. Grass hay production is part of the operation to supplemental feeding requirements during the winter months and times when public lands are not available. Purchased alfalfa hay is used to further supplement cattle nutritional requirements. It is important to keep in mind that grazing on meadows and raising meadow hay cannot be done at the same time. Grazing meadows will open up more summer forage, but at the expense of winter-feed. The productivity and cost variation of purchased feed, range forage, and meadow forage are what the model is trying to optimize.

## **Net Returns**

The model maximizes discounted net ranch income over a 40-year time horizon. Net ranch income is defined as gross revenues from cattle and crop operations minus foraging costs, animal costs, and crop costs. Subtracting from net ranch income family expenditures and enterprise fixed costs leaves returns to ownership. This definition of profitability is defined as the annual net returns that the ranch is able to transfer to the next period.

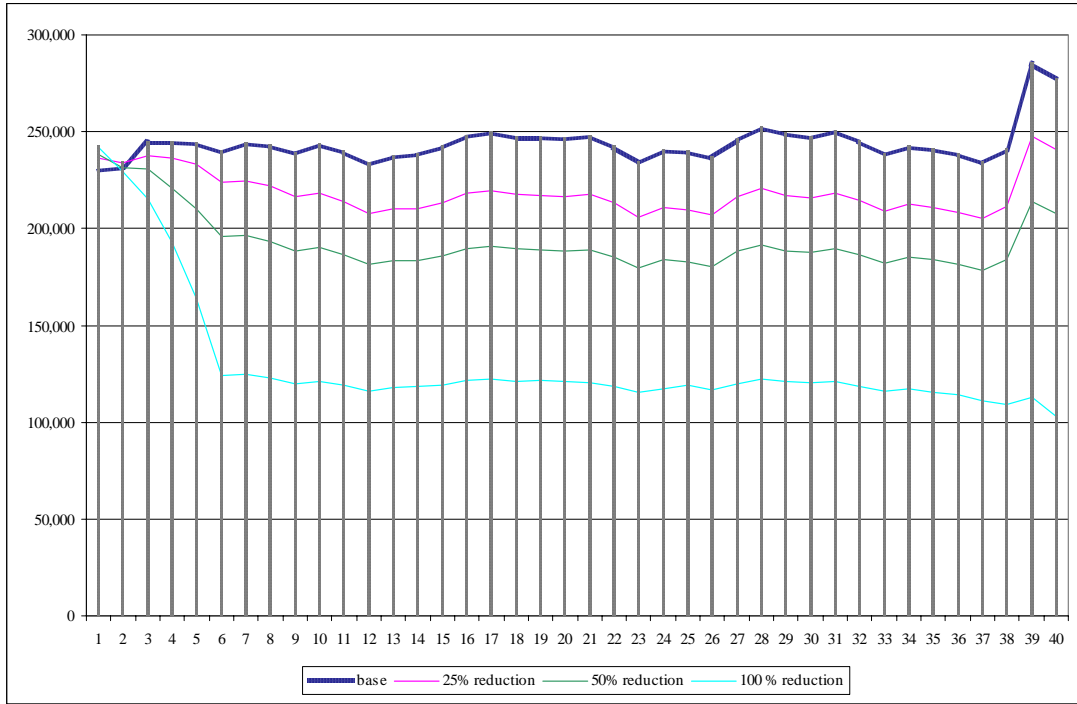
## **ANALYSIS**

Reductions in BLM forage availability are evaluated over a 40-year period for the firm. The analysis reduces BLM forage availability by 25 percent, 50 percent, and 100 percent. For this analysis reductions are phased in over six years. Because of the interspersed nature of state lands and the lack of fencing, it is assumed that there will be corresponding reductions in state land forage availability with reductions in BLM forage resources. Otherwise BLM land and State lands would need to be fenced off, which would be a substantial cost. Enterprise economic impacts of reducing BLM grazing on a representative ranch firm are presented in the next several figures and tables.

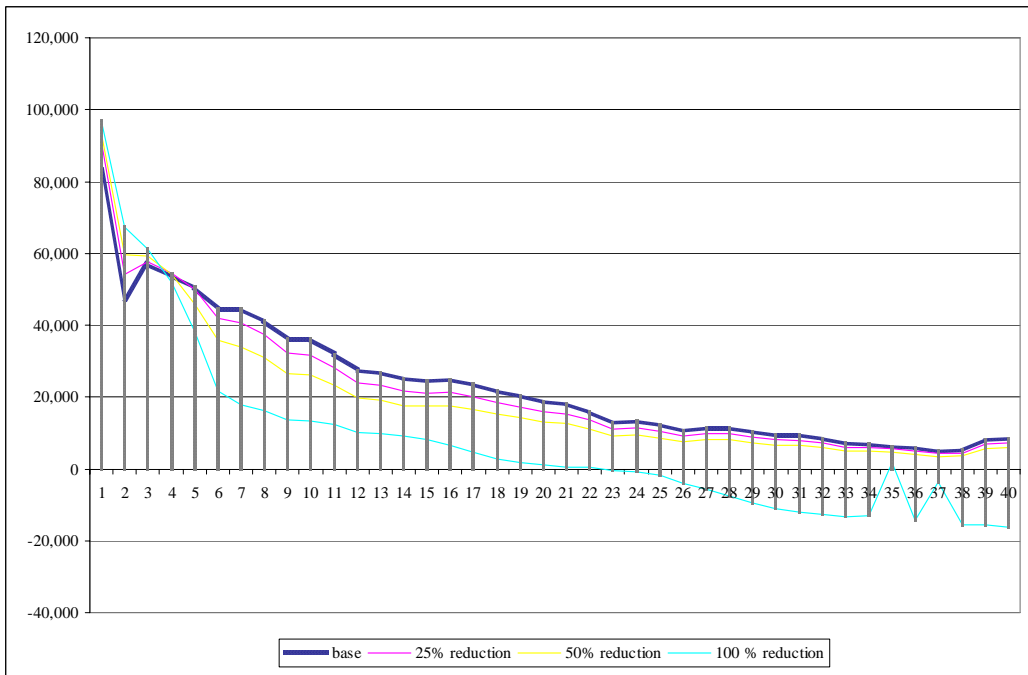
Gross returns from selling livestock and hay average between \$230,000 to \$267,000 over the forty-year period (Figure 2). The 25 percent, 50 percent, and 100 percent reduction in BLM forage resources cause a 10 percent, 21 percent, and 47 percent decline in revenues respectively.

Discounted net returns (the objective function) decrease on average by 10 to 25 percent from the baseline for 25 and 50 percent reductions respectively, and catastrophically for 100 percent reductions (Figure 3). Small increases occur early in the first four years because of lower animal costs but then decrease after that.

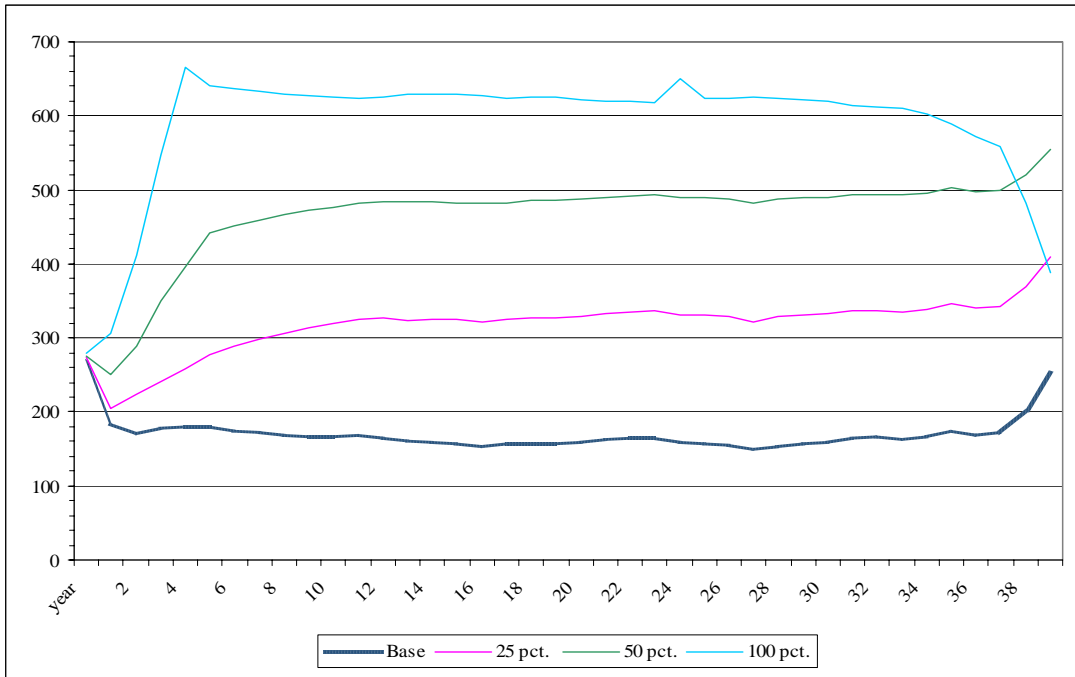
**Figure 2.** Gross revenues from cattle and hay production over the forty-year planning horizon for the baseline, 25, 50, and 100 percent reductions in BLM forage reduction scenarios.



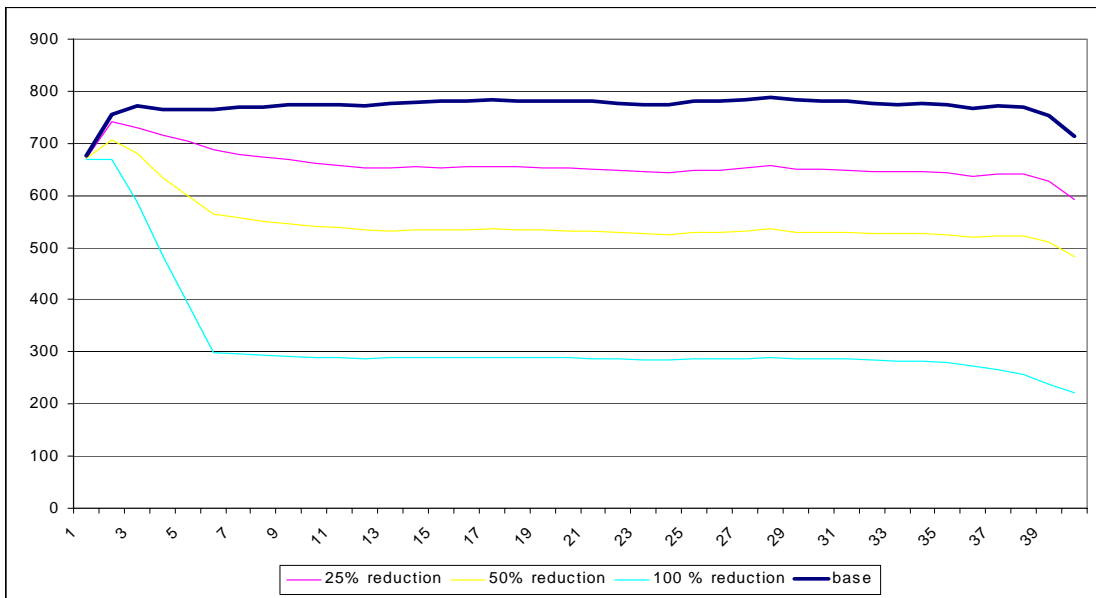
**Figure 3.** Discounted net returns above operating costs for the forty years with 25, 50 and 100 percent reductions in BLM grazing.



**Figure 4.** Hay sales for the forty years for the baseline and three scenarios.

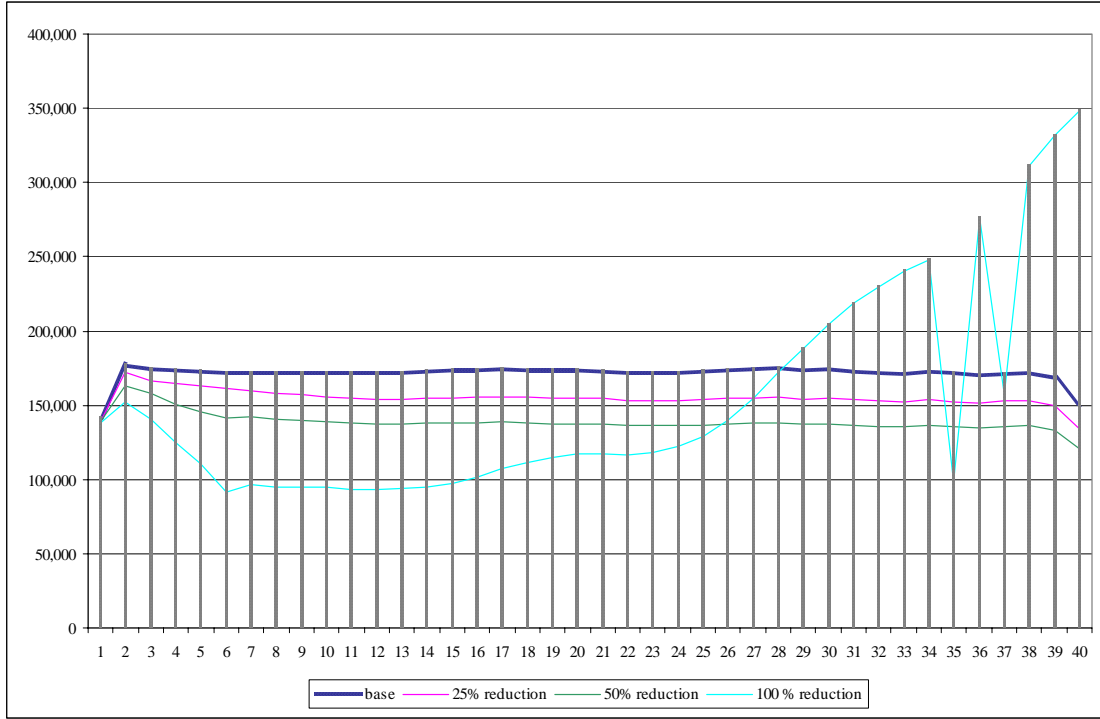


**Figure 5.** Average animal unit years for the three scenarios and the baseline.

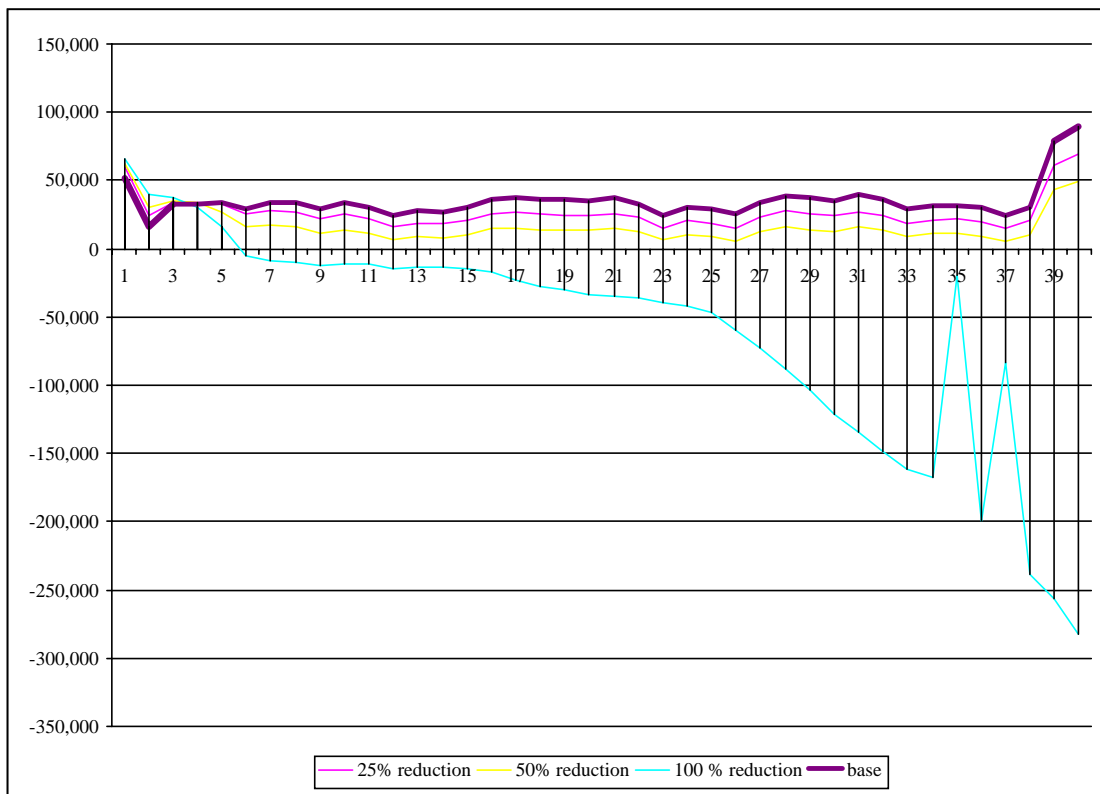




**Figure 6.** Total costs of production for the representative firm with a 25, 50 and 100 percent reduction in BLM grazing resources.



**Figure 7.** Returns to enterprise ownership over forty-year time horizon with a 25, 50 and 100 percent reduction in BLM grazing resources.



The modeling results show a major shift in the type of operation when BLM land is reduced. The operation shifts towards selling hay and away from cattle (Figures 4 and 5). Compared to the baseline analysis, hay sales increase by 87 percent to 250 percent. Hay sales in the early years in the baseline are lower as the firm builds herd size to the optimal level. In all three reduction scenarios though hay sales continues to increase. The 100 percent reduction scenario shows steep increases early and then a leveling out for most of the planning horizon. Cattle production is reduced as the availability of summer forage is reduced, forcing hay production to be sold instead of consumed (Figure 4).

An important qualification in the interpretation of these results is the impact of shifting to hay sales on the regional market. This analysis does not take into account the overall regional market effects on hay prices. Since this is a representative ranch for the region, removal of forage from the BLM will affect many producers. As these ranches move away from cattle production to selling hay, the price of hay will drop and reduce net returns even more than reported here. It depends upon how many firms move away from cattle production and how much federal land in the area is removed from livestock grazing. Net returns reported here assume no overall market effects. However, as more firms shift toward selling hay and away from cattle, regional supply will increase and hay prices will decrease (though there may be opportunities to export pelletized hay from the region). The results therefore can be viewed as an overestimate of net returns.

Shifting away from the optimal baseline strategy generates lower costs for the 25 percent reduction and 50 percent reduction, but higher costs overall for the operation in the 100 percent reduction scenario. (Figure 6.) A twenty-five percent reduction in BLM grazing resources generates 10 percent reduction in costs over the forty year horizon. A fifty percent reduction generates an average cost reduction of 19 percent, and a 100 percent reduction generates an 11 percent cost reduction average (though generates a 32 percent increase during the last 30 percent of the planning horizon.) Animal related costs decline by 15, 30, and 61 percent respectively. Returns to ownership show substantial reductions from the baseline, with 100 percent reductions dropping to substantially negative returns to ownership (Figure 7). The 25 percent and 50 percent reductions also show significant decreases though still positive returns. A 25 percent reduction in BLM forage availability causes an equal 25 percent reduction in returns to ownership. Likewise a 50 percent reduction in BLM forage availability causes a 52 percent reduction in returns to ownership. A 100 percent reduction in BLM forage availability causes the equivalent of a 50 percent reduction in returns to ownership by 5 years, and gets worse after that.

## **Conclusions**

Overall firm-level economic impacts of reducing BLM forage on a representative ranch operation can be quite significant depending upon the quantity of BLM forage that is made unavailable. An important aspect of ranching in the Rocky Mountain area is that summer grazing on public lands has no viable substitute during those seasons. Therefore reducing public lands grazing makes other forage sources less available because of conflicting seasonal uses. Private meadow is being hayed for winter feed and cannot be used as a summer grazing alternative. As BLM forage resources are removed from consideration the operation becomes more of a hay selling enterprise. However, since this is clearly a less profitable alternative the pressure to sell out and remove the private lands from ranching altogether increases.

The model does not predict the point at which a ranch will exit the market but it is clear that a 100 percent reduction will cause a considerable number of exits in the areas agricultural economy. Even the 50 percent reduction will very likely generate exits. A 50 percent reduction in BLM land corresponds with a 52 percent reduction in returns to ownership over the 40 year planning horizon.

BLM land and its link to State land provides an important forage resource that maintains ranching in the area. Firm level impacts of reducing this resource will result in multiplier impacts in the broader group of communities that Fremont County represents.

## **Part II: Economic Importance of Livestock Grazing in Fremont County**

The 1997 Census of Agriculture for Wyoming (U.S. Department of Agriculture) classifies farms and ranches by type, based on the North American Classification System (NAICS). This classification indicates that livestock grazing is the predominate type of agricultural operation found in Fremont County. As show in Table 4, 536 of the 983 farms and ranches found in the county were either beef cattle (491) or sheep and goats (45) operations. This represents nearly 55 percent of the total farms and ranches found in the county. The number of beef cattle ranches is more twice the number in the next largest category – other crops.

The definition of a farm or ranch used in the Census of Agriculture is very broad. Any operation with agricultural sales or the potential for agricultural sales of \$1,000 or more are counted in the census. As a result many non-commercial operations are included in the numbers. The census also provides estimates for farms and ranches with agricultural sales of \$10,000 or more. While this is still a rather low threshold, these numbers may be more reflective of commercial agriculture in Fremont County. From this perspective, 355 of the 569 “commercial” farms and ranches in the county are livestock grazing operations (Table 4). This represents over 62 percent of the “commercial” farms and ranches in the county. The number of beef cattle ranches is nearly 2.4 times the number in the next largest category – other crops.

Livestock grazing is of particular importance in Fremont County because of the role it plays in private land use in the county. The 2000 Equality State Almanac indicates that there are 868,716 acres of private land in Fremont County. The State of Wyoming’s Department of Revenue Annual Report indicates that 789,075 acres of land were taxed as agricultural land in Fremont County in 2000. A comparison of these two numbers indicates that over 90 percent of the private land in Fremont County is agricultural land. Of the total agricultural land, over 80 percent is classified as rangeland for tax purposes. Altogether private rangeland represents three-fourths of the total private land in Fremont County. As a result what happens to private rangeland has important implications for private land use in Fremont County.

One possible alternative use is residential development. If agricultural operators find their enterprises no longer economically viable and decide to exit the industry, rural residential development is a likely alternative. Shifting private land use away agriculture and towards rural residential development will increase county expenditures more than revenues (see Appendix B). Additionally, this move would also decrease open space and in some areas, important big game winter habitat.

**Table 4. Agricultural Operations in Fremont County, 1997**

Type	All Farms		Farm Sales \$10,000+	
	Number	Percent	Number	Percent
Oil & Grain	41	4.2%	31	5.4%
Vegetable & Melon	1	0.1%	0	0.0%
Fruit & Nuts	1	0.1%	1	0.2%
Greenhouse/Nursery	7	0.7%	7	1.2%
Other Crop	242	24.6%	143	25.1%
Beef Cattle	491	49.9%	338	59.4%
Cattle Feedlots	11	1.1%	8	1.4%
Dairy	3	0.3%	3	0.5%
Hogs	4	0.4%	1	0.2%
Poultry & Egg	2	0.2%	1	0.2%
Sheep & Goats	45	4.6%	17	3.0%
Other Animal	135	13.7%	19	3.3%
<b>Total</b>	<b>983</b>	<b>100.0%</b>	<b>569</b>	<b>100.0%</b>
Cattle/Sheep & Goat	536	54.5%	355	62.4%

*Source: 1997 Census of Agriculture, Wyoming State and County Data*

### **Importance of Federal Grazing**

Federal grazing is an important part of livestock production in Fremont County. The 1997 Census of Agriculture found that 261 ranches in the county held grazing permits with nearly 60 percent of these permits being from the Forest Service or the Bureau of Land Management (BLM). These ranches represent perhaps three-fourths of the livestock grazing operations in the county. These ranches are particularly important because they manage a total of over 898,000 acres of land including private, state, and small Federal leases.

Although most ranches are typically only partially dependent on federal land grazing for forage, this forage source is a critical part of their livestock operation. Greer (1994) and Taylor et al (1992) both found that while the reliance of ranchers on forage from federal land grazing can appear relatively unimportant when calculated on an acreage or AUM basis, they become quite important when calculated on a seasonal dependency basis. Much of a ranch's private land is used as hay ground to produce hay for winter feeding. Using hay acreage to feed cattle during the summer means a ranch has to purchase hay for the winter. The rigidity of seasonal forage availability means that the optimal use of other forages and resources are impacted when federal AUMs are not available Torell et al (2002). Bartlett (1983), Gee (1983), Hahn et al (1989), Bartlett et al (1979), Gee (1981), Perryman and Olson (1975), Rowe and Bartlett (2001), Torell

et al (1981), and Van Tassell and Richardson (1998) have all found that potential reductions in income and net ranch returns are greater than just the direct economic loss from reductions in federal grazing.

A ranch enterprise level analysis, utilizing a linear programming model of BLM dependent ranches in Fremont County developed through Western Regional Research Project #192, found that the reduction of BLM grazing would have the following impacts on the profitability of these ranches (Table 5):

- A 25 percent reduction in BLM grazing would reduce average annual net income for a typical ranch by 24.3 percent from \$34,855 to \$26,373.
- A 50 percent reduction in BLM grazing would reduce average annual net income for a typical ranch by 51.6% from \$34,855 to \$16,873.
- A 100 percent reduction in BLM grazing would reduce average annual net income for a typical ranch by 171.7% from \$34,855 to (\$59,848)

As noted in the discussion of the linear program model, these estimates were based on a Monte Carlo simulation using 40 years of cattle prices with 100 iterations over the 40 years. The results from this analysis are similar to those reported by Van Tassell and Richardson (1998) for ranches in Big Horn and Washakie Counties.

This firm level research suggests that there are at least three possible approaches to evaluating the economic importance of federal grazing to local communities: 1) examining Federal AUMs only, 2) examining Federal AUMs and the effects on total production, and 3) examining Federal AUMs and their effect on the economic viability of the ranch operation. Which of these approaches is the most relevant depends on a number of factors including the individual ranch's level of dependency on Federal grazing, the magnitude of the proposed change in grazing, the financial solvency of the ranch, the availability of alternative sources of forage, and the desire of the rancher to remain in ranching. The following considers the economic impact of BLM grazing in Fremont County on the local economy under each of the three perspectives.

### **Impact of BLM AUMs Only**

Allotment information from the BLM indicates that in 2001 the Lander Office administered about 272,600 AUMs of grazing used by Fremont County ranchers. Utilizing the Fremont County Input/Output Model (Taylor et al 1998) and a 10-year average of value of production for cattle in Wyoming (Tables 6 and 7), it is estimated that the BLM AUMs by themselves supported 277 jobs annually in Fremont County and \$3.9 million per year in labor earnings (Table 8). From this perspective a 25 percent reduction in BLM grazing would result in an estimated loss of 69 jobs and about \$1.0 million in labor earnings per year. Similarly, a 50 percent reduction in BLM grazing would result in an estimated loss of 138 jobs and about \$2.0 million in labor earnings per year. Finally, a 100 percent reduction in BLM grazing would result in a loss of all the economic impact associated with BLM grazing (277 jobs and \$3.9 million in labor earnings per year). This scenario assumes that the only affect on the ranch is the direct loss of the BLM grazing.

**Table 5.** Economic Impact of BLM Grazing on Ranches in Fremont County

	Base	25% Reduction	50% Reduction	100% Reduction
Total AUMs	9,252	7,908	6,564	3,804
BLM AUMs	3,765	2,824	1,883	0
Dependency	40.7%	35.7%	28.7%	0.0%
Ave. Annual Net Income	\$34,855	\$26,373	\$16,873	-\$59,848
Income Reduction		-24.3%	-51.6%	-171.7%
Change in Production		1,344	2,688	5,448
Change in BLM AUM		941	1,883	3,765
Change Per BLM AUM		1.428	1.428	1.447

Source: Fremont County BLM Dependent Ranch Linear Programming Model

### Impact of BLM AUMs on Total Production

As noted in the discussion of firm level research above, estimating the economic impact of Federal grazing reductions base solely on Federal AUMs probably underestimates the actual impact. Results from the Fremont County ranch model indicated that one AUM of BLM grazing actually supported the equivalent of 1.45 AUMs of livestock production for a typical BLM dependent ranch. Based on these results, the 272,600 AUMs of BLM grazing may actually represent 394,455 AUMs of livestock production in Fremont County (Table 8). From this

**Table 6.** Wyoming Livestock Production: 1992-2000

Year	Value of Production (\$000)	Beef Cows (Jan. 1)	AUM per Cow	Total Aums	VOP per Cow	Deflator	Deflated VOP per cow
1992	428,733	691,000	16	11,056,000	\$38.78	0.8804	\$44.05
1993	496,310	723,000	16	11,568,000	\$42.90	0.9458	\$45.36
1994	413,538	783,000	16	12,528,000	\$33.01	0.8941	\$36.92
1995	371,823	773,000	16	12,368,000	\$30.06	0.9394	\$32.00
1996	359,805	804,000	16	12,864,000	\$27.97	0.9733	\$28.74
1997	442,717	863,000	16	13,808,000	\$32.06	0.9849	\$32.55
1998	400,637	874,000	16	13,984,000	\$28.65	0.9878	\$29.00
1999	452,058	824,000	16	13,184,000	\$34.29	1.0000	\$34.29
2000	497,851	824,000	16	13,184,000	\$37.76	1.0120	\$37.31
2001	545,147	845,000	16	13,520,000	\$40.32	1.0240	\$39.38
	(1)	(1)	(2)			(3)	
10 Year Average					\$34.58		\$35.96

Sources:

(1) Wyoming Agricultural Statistics, Various

(2) Workman, J.P. Range Economics, Macmillian Publishing, Inc., New York, NY.

(3) IMPLAN

perspective the BLM AUMs support 401 jobs annually in Fremont County and \$5.7 million in labor earnings per year. Under this scenario a 25 percent reduction in BLM grazing would result in an estimated loss of 99 jobs and about \$1.4 million in labor earnings per year. Similarly, a 50

percent reduction in BLM grazing would result in an estimated loss of 198 jobs and about \$2.8 million in labor earnings per year. Finally, a 100 percent reduction in BLM grazing would result in a loss of all the economic impact associated with livestock production from BLM grazing (401 jobs and \$5.7 million in labor earnings per year). This scenario considers the change in total production resulting from the loss of BLM grazing assuming that the ranch remains in operation.

**Table 7. Economic Impact Per AUM for Fremont County: 1992-2001**

Impact	
Direct Impact	\$35.96
Total Impact	\$75.45
Labor Earnings	\$14.47
Employment	0.001016

*Source: Fremont County Input/Output Model*

### Impact of BLM AUMs and Ranch Viability

Previous research and results from the Fremont County ranch model indicates that BLM AUMs may be critical to the economic viability of the typical BLM dependent ranch. For example a 100 percent reduction in BLM grazing is estimated to reduce average annual net income for the model ranch to -\$59,848. Any business activity that has an average net income of -\$59,848 is probably not very economically viable. Even a 24 or 52 percent reduction in profitability might financially stress many livestock operations. If BLM AUMs were critical to the economic viability of the ranching operation, the ranch model indicates that one AUM of BLM grazing would support 2.46 AUMs of livestock production for a typical BLM dependent ranch. Based on these results, the 272,600 AUMs of BLM grazing may actually represent 669,879 AUMs of livestock production in Fremont County. As shown in Table 8, from this perspective the BLM AUMs support 681 jobs in Fremont County and \$9.7 million in labor earnings per year. Under this scenario a 25, 50, or 100 percent reduction in BLM grazing would result in a loss of all the economic impact associated with ranching operations dependent on BLM grazing (681 jobs and \$9.7 million in labor earnings per year). This scenario assumes that the ranch goes out of business with a reduction in BLM grazing.

**Table 8. Economic Impact of BLM AUMs in Fremont County**

	BLM AUMs		Economic	BLM AUMs	Total	Economic
	Only	Total AUMs	Viability	Only (per AUM)	Production (per AUM)	Viability (per AUM)
AUMs	272,600	394,455	669,879	1.00	1.45	2.46
Direct Impact	\$9,802,696	\$14,184,618	\$24,088,856	\$35.96	\$52.03	\$88.37
Total Impact	\$20,567,670	\$29,761,664	\$50,542,386	\$75.45	\$109.18	\$185.41
Labor Earnings	\$3,944,522	\$5,707,770	\$9,693,152	\$14.47	\$20.94	\$35.56
Employment	277	401	661	0.001016	0.001470	0.002497

## **Summary and Conclusions**

The results from this analysis indicates that livestock grazing is the predominate type of “commercial” agricultural operation found in Fremont County and that it is the dominate form of land use for private land in the county. Federal livestock grazing is an important part of livestock production in terms of the number of producers affected, the acres of land involved, and economic effects on the individual agricultural operations. Federal livestock grazing also has important economic implications for the local community. The total economic impact estimates for BLM grazing in Fremont County range from 277 to 681 jobs and \$3.9 to \$9.7 million in labor income. This employment and labor income is important not only to the employed individuals but also to their families.

Although there were 21,845 jobs in Fremont County in 2002 (U.S. Department of Commerce), the 277 to 681 jobs associated with BLM livestock grazing is not an insignificant amount of employment in the county. For example, it has been estimated that travel related employment in Fremont County increased by slightly less than one percent per year between 1997 and 2002 (Dean Runyan Associates, 2003). At this growth rate it would take between 15 and 33 years for the travel industry to replace the jobs associated with BLM grazing in Fremont County. Even if the growth rate for travel were to double from the 1997 to 2002 level, it would still take 8 to 17 years to replace the jobs associated with BLM grazing in Fremont County. Thus the loss of employment associated with decreases in BLM grazing in Fremont County may not be readily replaced by other economic activities.



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## APPENDIX A: Livestock enterprise budget, Fremont County, Wyoming

**Table 1.** Enterprise Budget, 600 Cow 70/20/10-BLM/ Private/State land. Fremont County, Wyoming

	Weight	of Head	Price or	Total Value	Value or	Your Value
	Each	Unit	Or Units	Cost/Unit	Cost/Head	
<b>Gross Receipts</b>						
Heifer calves (backgrounded)	6	cwt	180	\$71.35	\$77,058.00	\$128.43
Yearling heifers	7.25	cwt	34	\$65.49	\$16,143.29	\$26.91
2 yr old heifers	9	cwt	13	\$60.48	\$7,076.16	\$11.79
Cows	11	cwt	65	\$36.10	\$25,811.50	\$43.02
Bulls	18	cwt	4	\$44.71	\$3,219.12	\$5.37
Steers (backgrounded)	6.5	cwt	288	\$78.86	\$147,625.92	\$246.04
<b>Total Receipts</b>					\$276,933.99	\$461.56
<b>Operating Costs</b>						
BLM range		aum	3765	1.35	\$5,082.75	\$8.47
State range land (summer)		aum	537.84	4.95	\$2,662.31	\$4.44
Crop aftermath		aum	1080.04	11.86	\$12,809.27	\$21.35
Alfalfa hay		ton	793.44	75.7	\$60,063.41	\$100.11
Corn		bu	742.8	2.62	\$1,946.14	\$3.24
Weaning pellets		ton	14.5	400	\$5,800.00	\$9.67
Salt		lb	11265.24	0.06	\$675.91	\$1.13
Feed tub		lb	81119.24	0.15	\$12,167.89	\$20.28
Corn silage		ton	81.88	25	\$2,047.00	\$3.41
Freight/trucking		mile	1770	2.25	\$3,982.50	\$6.64
Advertising		ad	13	50	\$650.00	\$1.08
Electricity		kwh	7000	0.05	\$350.00	\$0.58
Veterinary Medicine		\$	2636.44	1	\$2,636.44	\$4.39
Machinery (fuel, lubrication, repair)		\$	2520.88	1	\$2,520.88	\$4.20
Vehicles (fuel, repair)		\$	9047.08	1	\$9,047.08	\$15.08
Equipment (repair)		\$	801.75	1	\$801.75	\$1.34
Housing and Improvements (repair)		\$	3175	1	\$3,175.00	\$5.29
Hired Labor		hour	3,744.00	7.00	26,208.00	43.68
Owner Labor		hour	1,248.00	7.00	8,736.00	14.56
<b>Total Operating Costs</b>					\$161,362.33	\$268.94
<b>Income Above Operating Costs</b>					\$115,571.66	\$192.62
<b>Ownership Costs</b>						
Buildings improvements and Equipment						
Capital Recovery		\$			\$15,458.77	\$25.76
Annual taxes and insurance		\$			\$861.37	\$1.44
Purchased Livestock						
Capital Recovery:		\$			\$1,039.27	\$1.73
Annual taxes and insurance		\$				
Retained Livestock						
Long-term investment		\$			\$15,769.35	\$26.28
Machinery and vehicles						
Capital Recovery		\$			\$19,379.40	\$32.30
Annual taxes and insurance		\$			\$1,242.02	\$2.07
Land Resources						
Annual taxes and insurance		\$			409.28	\$0.68
Long-term investment		\$			11,531.62	\$19.22
Overhead		\$			20,000.00	\$33.33
<b>Total ownership costs</b>					\$85,691.08	\$142.82
<b>Total costs</b>					\$247,053.41	\$411.76
<b>Returns to Capital, Risk and Management</b>					\$29,880.58	\$49.80

**Table 2: Monthly Summary of Returns and Expenses.**

	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Value
<b>Production:</b>													
Heifer calves (bkgrounded)	77058	0	0	0	0	0	0	0	0	0	0	0	77058
Yearling heifers	16143	0	0	0	0	0	0	0	0	0	0	0	16143
2 yr old heifers	0	0	0	0	0	0	0	0	0	0	7076	0	7076
Cows	0	0	0	0	0	0	0	0	0	0	25812	0	25812
Bulls	0	0	0	0	0	0	0	0	0	0	3219	0	3219
Steers (backgrounded)	147626	0	0	0	0	0	0	0	0	0	0	0	147626
<b>Total Receipts</b>	<b>240827</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>36107</b>	<b>0</b>	<b>\$0 \$276,934</b>
<b>Operating Inputs:</b>													
BLM range	0	0	0	0	847	847	847	847	847	847	0	0	5082
State range land (summer)	0	0	0	0	444	444	444	444	444	444	0	0	2664
Crop aftermath	0	0	0	0	0	0	0	0	0	0	6405	6405	12810
Alfalfa hay	13347	13347	13347	13347	6674	0	0	0	0	0	0	0	60062
Corn	29719	29719	29719	29719	0	0	0	0	0	0	0	0	118876
Weaning pellets	0	0	0	0	0	0	0	0	0	0	5800	0	5800
Salt	56	56	56	56	56	56	56	56	56	56	56	56	672
Feed tub	3042	3042	3042	3042	0	0	0	0	0	0	0	0	12168
Corn silage	512	512	512	512	0	0	0	0	0	0	0	0	2048
Freight/trucking	0	0	0	0	1991	0	0	0	0	0	1991	0	3982
Advertising	50	50	50	50	50	50	50	50	50	50	100	50	650
electricity	40	40	40	30	20	20	20	20	20	30	30	40	350
Veterinary Medicine	0	0	0	0	939	0	0	0	0	0	1697	0	2636
Machinery (Fuel,Lube,Repair)	0	1209	1312	0	0	0	0	0	0	0	0	0	2521
Vehicles (Fuel and Repair)	0	3167	5880	0	0	0	0	0	0	0	0	0	9047
Equipment (Repair)	67	67	67	67	67	67	67	67	67	67	67	67	804
Housing, Improvements (Repair)	264	264	264	264	264	264	264	264	264	264	264	266	3170
Taxes and Insurance	1492	0	0	0	0	611	0	0	0	0	0	0	2103
Hired Labor	2184	2184	2184	2184	2184	2184	2184	2184	2184	2184	2184	2184	26208
<b>Total Costs</b>	<b>\$50,773</b>	<b>\$53,657</b>	<b>\$56,473</b>	<b>\$49,271</b>	<b>\$13,536</b>	<b>\$4,543</b>	<b>\$3,932</b>	<b>\$3,932</b>	<b>\$3,932</b>	<b>\$3,942</b>	<b>\$18,594</b>	<b>\$9,068</b>	<b>\$271,653</b>
<b>Net Returns</b>	<b>\$190,054</b>	<b>-\$53,657</b>	<b>-\$56,473</b>	<b>-\$49,271</b>	<b>-\$13,536</b>	<b>-\$4,543</b>	<b>-\$3,932</b>	<b>-\$3,932</b>	<b>-\$3,932</b>	<b>-\$3,942</b>	<b>\$17,513</b>	<b>-\$9,068</b>	<b>\$5,281</b>

**Table 3:** Investment Summary.

	Purchase Price	Salvage/Cull Value	Livestock Share	Useful Life	Capital Recovery	Annual Taxes and Insurance	Long-term Interest	Total Ownership
<b>Buildings, Improvements and Equipment</b>								
Bunkhouse	\$50,000.00	\$1,000.00	50	30	\$2,375.80	\$132.60		\$2,508.40
Shop (40x60)	\$40,000.00	\$2,000.00	50	30	\$1,896.03	\$109.20		\$2,005.23
Fencing	\$35,000.00	\$3,500.00	100	25	\$3,448.42	\$200.20		\$3,648.62
Corrals	\$30,000.00	\$3,000.00	100	30	\$2,832.52	\$171.60		\$3,004.12
Calving barn	\$7,000.00	\$700.00	100	30	\$660.92	\$40.04		\$700.96
Water developments	\$14,000.00	\$1,400.00	100	30	\$1,321.84	\$80.08		\$1,401.92
Gooseneck trailer	\$7,000.00	\$1,000.00	100	15	\$820.90	\$41.60		\$862.50
Squeeze chute	\$2,200.00	\$220.00	100	10	\$324.39	\$12.58		\$336.97
Vet equipment	\$650.00	\$65.00	100	10	\$95.84	\$3.72		\$99.56
Post hole auger	\$750.00	\$75.00	100	10	\$110.59	\$4.29		\$114.88
Rear blade	\$1,100.00	\$110.00	100	10	\$162.19	\$6.29		\$168.48
Shop equipment	\$5,000.00	\$500.00	100	10	\$737.24	\$28.60		\$765.84
Granary (300bu)	\$500.00	\$100.00	100	10	\$70.39	\$3.12		\$73.51
6-feed bunks	\$1,400.00	\$140.00	100	10	\$206.43	\$8.01		\$214.44
Branding iron heater	\$200.00	\$20.00	100	10	\$29.49	\$1.14		\$30.63
Cake feeder	\$1,200.00	\$120.00	100	10	\$176.94	\$6.86		\$183.80
Fuel tanks	\$1,000.00	\$100.00	100	30	\$94.42	\$5.72		\$100.14
Electric fence	\$1,000.00	\$100.00	100	30	\$94.42	\$5.72		\$100.14
<b>Total</b>	<b>\$198,000.00</b>	<b>\$14,150.00</b>			<b>\$15,458.77</b>	<b>\$861.37</b>		<b>\$16,320.14</b>
<b>Purchased Livestock</b>								
Bulls	\$3,600.00	\$300.00	100	4	\$1,039.27			\$1,039.27
<b>Total</b>					<b>\$1,039.27</b>			<b>\$1,039.27</b>
<b>Retained Livestock</b>								
Heifer calves	\$47,091.60	\$4,708.80	100				\$2,266.27	\$2,266.27
Cows	\$177,459.00	\$17,745.90	100				\$8,540.21	\$8,540.21
Bulls	\$25,752.96	\$2,575.36	100				\$1,239.36	\$1,239.36
Yearling heifers	\$40,358.00	\$4,035.80	100				\$1,942.23	\$1,942.23
2 yr old heifers	\$37,013.76	\$3,701.24	100				\$1,781.28	\$1,781.28
<b>Total</b>	<b>\$327,675.32</b>	<b>\$32,767.10</b>					<b>\$15,769.35</b>	<b>\$15,769.35</b>
<b>Machinery and Vehicles</b>								
Tractor loader	\$35,600.00	\$7,100.00	50	30	\$1,667.02	\$111.02		\$1,778.04
Tractor - 80hp	\$30,000.00	\$6,000.00	50	30	\$1,404.73	\$93.60		\$1,498.33
Pickup nr1 4x4 3/4 ton	\$27,000.00	\$5,400.00	100	6	\$5,251.73	\$340.20		\$5,591.93
Pickup nr2 4x2 1/2 ton	\$20,000.00	\$2,000.00	100	3	\$6,632.10	\$231.00		\$6,863.10
4 wheeler nr1	\$5,000.00	\$1,000.00	100	5	\$1,109.21	\$63.00		\$1,172.21
Feed Truck- 2 ton	\$32,000.00	\$6,400.00	100	20	\$3,314.61	\$403.20		\$3,717.81
<b>Total</b>	<b>\$149,600.00</b>	<b>\$27,900.00</b>			<b>\$19,379.40</b>	<b>\$1,242.02</b>		<b>\$20,621.42</b>
<b>Land Resources</b>								
Deeded range land	\$192,193.67		100			\$409.28	\$11,531.62	\$11,940.90
<b>Total</b>	<b>\$192,193.67</b>					<b>\$409.28</b>	<b>\$11,531.62</b>	<b>\$11,940.90</b>

## Appendix B: RANCHLAND CONVERSION IN FREMONT COUNTY

By David T. Taylor

### Overview

The American Farmland Trust (AFT) estimates that nearly 50 percent of the private land in Fremont County is “prime” ranchland. The AFT defines “prime” ranchland as high quality land with desirable wildlife characteristics including proximity to publicly owned lands, year-round water availability, mixed grass and tree cover, and a variety of vegetation. Because of the proximity of ranchland to developed areas of the county, the AFT estimates that 64 percent of the prime ranchlands in Fremont County could potentially be development over the next 20 years. This represents 296,960 acres of prime ranchland and ranks Fremont County 21st among all Western U.S. counties in terms of prime ranchland with potential for development. If the AFT estimates are correct, the potential loss of prime ranch land has important implications for the continuation of an agricultural setting in many parts of Fremont County. It also has important implications for wildlife habitat since on average, 49 percent of the state is seasonal grazing for wildlife (Coupal et al, 2002a).

### Cost of Ranchland Conversion

The conversion of agricultural land to residential development also has substantial fiscal implications for county government and schools in Fremont County. Heimlich and Anderson (2001) identified 88 costs of community service studies across the country. All these studies found that local government revenues from agricultural production exceeded the costs, while the local government costs for residential development exceeded the revenues. The average expenditure to revenue ratio for agricultural production was \$0.38 of costs per \$1.00 of revenue. The average expenditure to revenue ratio for residential development was \$1.24 in cost per \$1.00 of revenue. Taylor and Coupal (2000) found that the average expenditure to revenue ratio for agricultural production in Wyoming was \$0.54 of cost per \$1.00 of revenue. In addition, the average expenditure to revenue ratio for residential development in Wyoming was \$2.01 in costs per \$1.00 of revenue. These studies all imply that the conversion of agricultural land to residential development represents a net loss to county government. Coupal et al (2002b) confirmed that this was true, on average, at least for counties in Wyoming.

Table 1 summarizes the cost of rural residential development to the county and schools in Fremont County assuming the conversion of 35 acres of agricultural land to one rural residence (Coupal et al, 2002b). Under the existing local government revenue and cost structure, gross revenues would increase by \$2,774 from the conversion, however expenditures would increase by \$3,116 for a net loss of \$342 per new 35-acre residence. If the entire 296,960 acres of prime ranchland were converted to 35-acres residences, the net cost to county government would be \$2.9 million per year. If the useful life of these residences were 35 years, the net cost to county government over the life of the structures would be \$101.5 million.

Of course residential development is unlikely to occur all at once. To consider the effects of timing on the costs of rural residential development to county government in Fremont County a 20-year build out scenario was analyzed. This assumes that the conversion of the 296,960 acres of prime ranchland occurs evenly over a 20-year period. The scenario was discounted at six

percent and assumed a 35-year useful life for the residences. As shown in Table 1, the net present value of the 20-year build out was a negative \$25.6 million. This amount represents the future costs to county government from conversion of agricultural land to rural residential development in today's dollars.

### **Summary and Conclusions**

The American Farm Land Trust estimates that 296,960 acres of prime ranchland in Fremont County could potentially be development over the next 20 years. Conversion of this land to residential development would have important implications for the agricultural setting and winter wildlife habitat in the county.

It would also have important implications for county government finances. Conversion of agricultural lands to rural residential development typically results in a net loss to county government. In Fremont County it is estimated that conversion of the 296,960 acres of ranchland into 35-acre residences would cost county government up to \$2.9 million per year. Over the life of these structures the total cost to county government could be up to \$101.5 million. Assuming a 20-year build out for the ranchland, the net present value of the conversion is a negative \$25.6 million.

Of course forecasting 20 years into the future is speculative. Travis et al (2002) found that more than 218,500 acres of ranch land had been sold in Fremont County between 1990 and 2001. Of this total 46 percent was sold to traditional ranchers, 8 percent to part-time ranchers, 14 percent to amenity buyers, 0 percent to developers, 6 percent to investors, 6 percent to corporate owners, 6 percent to conservation organizations, and 14 percent to other types of buyers. This indicates that while a substantial amount of ranchland has been changing hands in the county in recent years, zero acres went directly to developers. However, as note by Travis et al, "...the current transition in ranchland probably implies a long period of instability in ranchland status and uncertainty over the role ranchland will play." Ownership turnover may increase the likelihood of development. Because current ranchland sales are not to developers does not mean that the situation won't change in the future. As a result the future of ranchland will probably depend to a large extent on the resiliency of traditional ranchers and amenity buyers in the Fremont County ranchland market.

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**Table 1.** The Estimated Cost of Ranchland Conversion in Fremont County\*

Gross Revenue Increase Per Residence	\$2,774
Expenditure Increase Per Residence	<u>\$3,116</u>
Net Revenue Loss Per Residence	<b>-\$342</b>
Ranchland Conversion (Acres)	296,960
Acres Per Residence	<u>35</u>
New Rural Residences	8,484
New Rural Residences	8,484
Net Revenue Loss Per Residence	<u>-\$342</u>
Annual Net Revenue Loss	<b>-\$2,901,528</b>
Total Annual Net Revenue Loss	-\$2,901,528
Useful Life of Residence (Years)	<u>35</u>
Lifetime Net Revenue Loss	<b>-\$101,553,480</b>
NPV with 20 Year Build Out @6%	<b>-\$25,571,097</b>

\*Assumes conversion of 35 acres of ranchland to one 35-acre rural residence and continuation of the existing local government revenue and cost structure.