

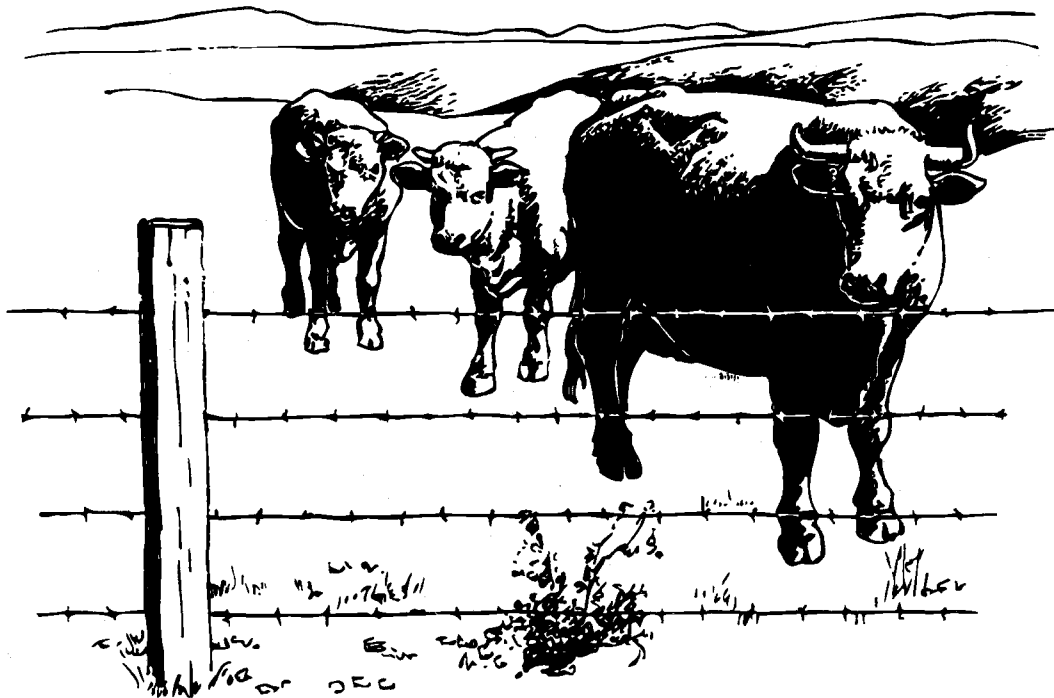
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# **THE OREGON BEEF CATTLE INDUSTRY: IMPACT ON THE OREGON ECONOMY**



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# **THE OREGON BEEF CATTLE INDUSTRY:**

## **IMPACT ON THE OREGON ECONOMY**

Report submitted to

The Oregon Beef Council

in fulfillment of a contract with the

Oregon State University Agricultural Research Foundation

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September 1997

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## Preface

This report was prepared at the request of the Oregon Beef Council and the Oregon Cattleman's Association. The intent was to pull together in one report information related to the beef cattle industry in Oregon. Information was compiled from a variety of sources and as such may be from different reporting years. In some cases, information is reported only for cattle and calves and could not be broken out to beef cattle alone.

We believe, nevertheless, that the information collected tells the story of the beef cattle industry in Oregon and how it has changed over the past 140 plus years. We were able to analyze the impacts of different policy changes and

prices on both representative ranches and regions of the state.

All of the information contained herein is believed to be in the public domain and is readily available from the sources listed in the "Literature Cited" section of this report. Other agencies or entities may have other sources of information. In some cases, different state and federal agencies collect the same type of information but use different methods, resulting in slightly different numbers being reported. We do not think these differences are a large problem for our purposes. You should be aware that these differences occur and, depending on your use of the data, you can decide how important they are for your purposes.

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## Introduction

Missionaries and early settlers began to raise cattle in western Oregon and the Columbia Basin by 1840 (Oliphant 1947). The earliest cattle, Andalusian blacks, were of Spanish descent brought by missionaries from Mexico to Texas and then to California in 1769 (Simpson 1987). The Willamette Valley cattle industry grew rapidly as surplus cattle were shipped northward from California to feed the growing number of miners and settlers (Simpson 1987). The long stream of settlers traveling the Oregon Trail brought another type of cattle, an "American" cattle breed. Typically, these were Durham breed cattle hitched to the family wagons at Independence, Missouri. By 1846, Andalusian blacks had virtually disappeared from the Oregon cattle industry.

During the mining rushes of the early 1860s, large herds of cattle began to move out of the Willamette Valley to feed miners in southern Idaho and eastern Oregon. The Census of 1860 shows that only a few thousand cattle were reported east of the Cascades in Wasco County. The extensive cattle industry in southeastern Oregon began in the 1870s.

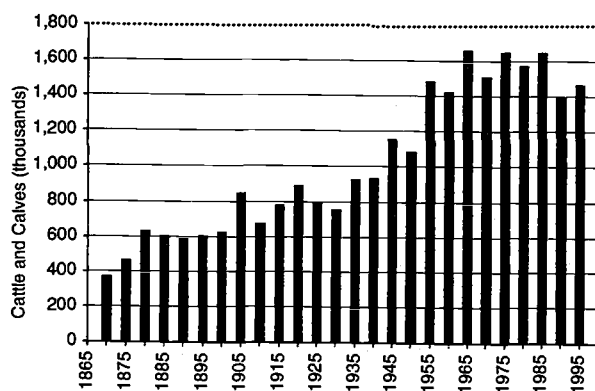


Figure 1. Number of cattle and calves in Oregon (USDA OASS 1996).

Movement of cattle to this area followed in the wake of the California "herd laws" of 1864, the removal of the eastern Oregon Indian barrier in 1868, and the completion of the transcontinental railroad in 1869 (Simpson 1987). Southeastern Oregon began to attract the funds of large California investors who brought cattle from both California and western Oregon stocks. By 1870, Oregon was predominantly cattleman's country with a few farmers scattered here and there. A decade later, the day of the cattlemen was seeing its demise in the Columbia Basin and Willamette Valley.

In the Blue Mountains of eastern Oregon and in southeastern Oregon, cattle continued to graze. Southeastern Oregon saw extensive consolidation of interests and the development of Oregon's "cattle kings." Peter French arrived in southeastern Oregon in 1872, and by 1879 he was managing two of the largest ranches in the state—the P Ranch and the Diamond Ranch. John S. Devine laid out the Whitehorse Ranch in the southeastern part of the state in 1869. In 1882, Devine and his partner W.B. Todhunter were said to possess more than 20,000 head of stock cattle and three ranches in Oregon (Oliphant 1947). Thus, cattle became a part of Oregon's economic backbone.

There were fewer than 400,000 cattle in 1870 (Figure 1). In 1945, over a million cattle and calves are recorded. Although cattle populations have fluctuated, an upward trend in total numbers continued until 1965. Since 1965, the beef industry has followed a 5-year cycle of low and high numbers. Oregon cattle and calves, as well as beef cow populations, peaked in 1982 at 1,800,000 and 730,000, respectively. (Cattle and calves includes all adult and young beef and dairy animals in inventory, while beef cows refers only to the breeding female beef animals.) The general trend in numbers of both cattle and calves and beef cows has fallen since the mid-1980s (Figures 1 and 2). In 1995, the number of beef

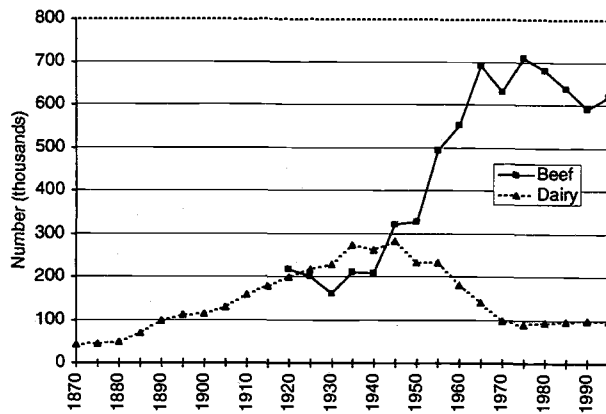


Figure 2. Number of beef and milk cows in Oregon (USDA OASS 1996).

cows was nearly the same as in 1963. Beef cow numbers surpassed dairy cows in the late 1940s. Since 1970, dairy cow numbers have been fairly stable.

Oregon's varied climate and topography have played an instrumental role in the current distribution of the cattle industry. The cattle industry had its earliest roots in the cool, moist Willamette Valley. Although the dairy industry still is based largely in this area, the beef industry moved into the arid regions of the state, primarily east of the Cascades. The most extensive cattle herds are found in the mountains and rangelands of central, southeastern, and northeastern Oregon.

Access to public rangelands also has been a critical factor in shaping the beef cattle industry in the state. The U.S. Forest Service and Bureau of Land Management (Figure 3) hold more than 50 percent of Oregon's lands. Much of this land is open to permit grazing by local cattle operators. More than 37 percent of the total land area of Oregon is in grassland pasture, in addition to the 42 percent in forest lands, which include grazable lands (Table 1).

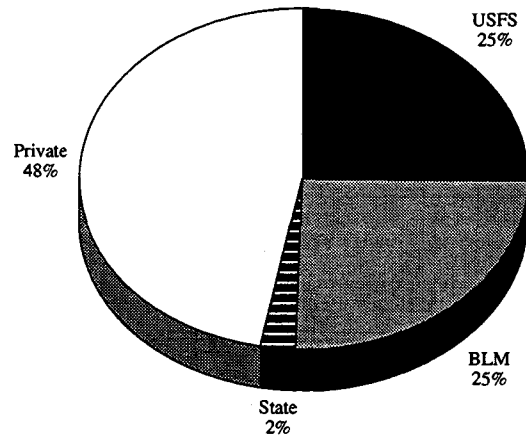


Figure 3. Land ownership in Oregon (USDC 1996, State of Oregon 1996).

Table 1. Land use in Oregon (USDA NASS 1996).

	Acres (1,000)	Percent
Cropland		
<i>Crops</i>	3,695	6.00
<i>Idle</i>	831	1.35
<i>Pasture Only</i>	858	1.39
Grassland Pasture	22,913	37.22
Forest Land	26,278	42.69
Special Other Uses	3,568	5.80
Other Land	3,415	5.55
<b>Total Land Area</b>	<b>61,558</b>	<b>100.00</b>

## Operational Characteristics

The diversity of Oregon's climate and topography are only two of a set of complex factors influencing any beef operation. Although each operation is unique, some general comparisons can be made across production cycles, sizes, and other characteristics.

## The Production Cycle

Oregon cattle operators have established primary and secondary calving seasons for a variety of reasons, including marketing, holding open cows, avoiding inclement weather, and feed resources. The traditional calving season occurs in spring (February to April) on private lowlands where the operator can easily watch the herd. The herd may be fed hay until spring rangelands or grassland pastures become available. In the Mountain and North Central Plateau regions of Oregon

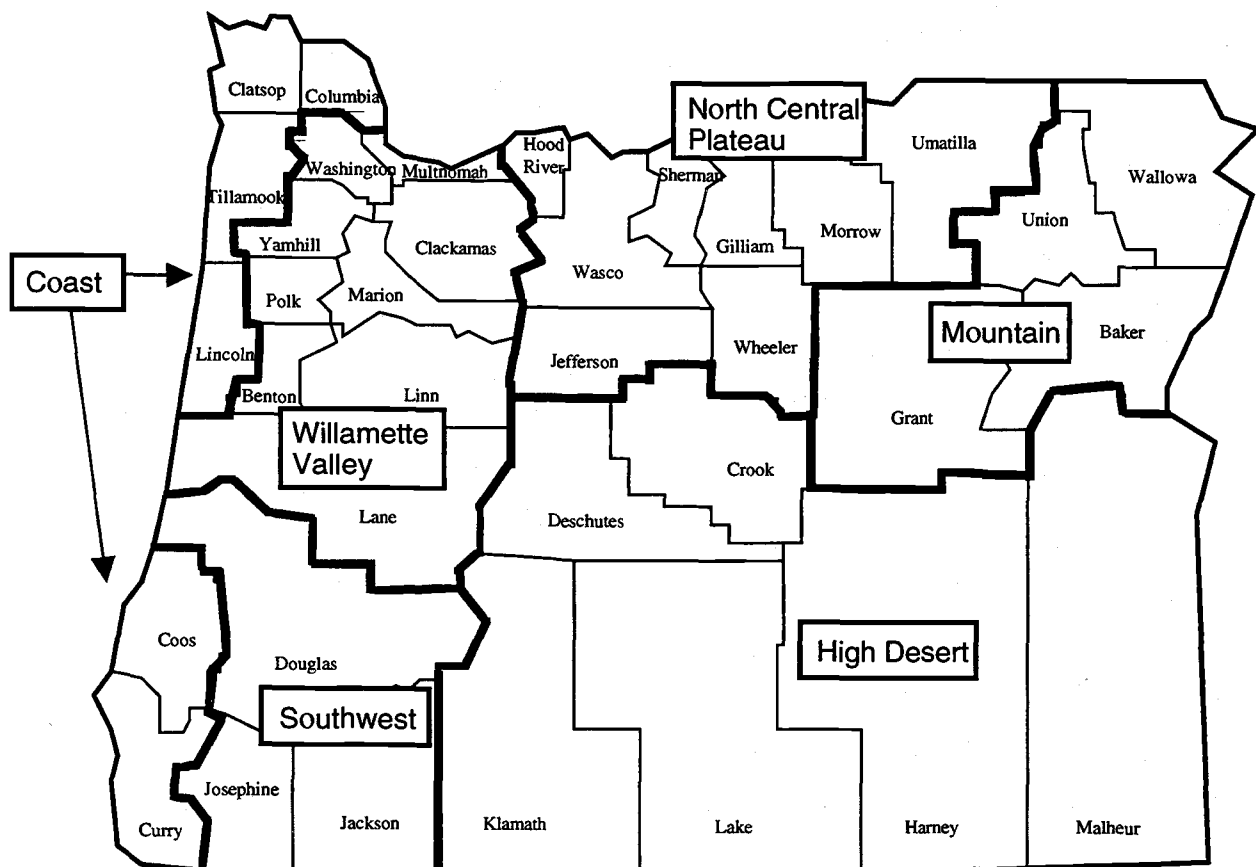


Figure 4. Oregon counties and regions used in this publication.



(Figure 4), cattle may be moved onto public rangelands for 3 to 4 months during the summer. In the High Desert region, cattle may move to public rangelands any time during the year, with the most use occurring in April through September (Greer 1996). Calves are weaned in the fall and then either sold, kept and sold as yearlings, or fed to slaughter weight and then sold. Nonproductive cows are culled, and replacement heifers are selected in the fall. The development of a fall calving season alters this schedule slightly, as cows are bred to calve in the fall, with the calves sold either the next spring or kept to be sold as yearlings the following fall.

Winter feeding varies by location and availability of forage, although hay feeding is the most widespread. Areas with irrigated farmland may provide a ready source of crop residue for grazing, although the nutritional level may require supplementation. The availability of low-elevation winter range grazing provides the opportunity for minimizing hay feeding. In the High Desert region, Greer (1996) found between 4 and 14 percent of monthly forage demand came from public rangelands between November and March. A final option is to ship the base herd to rangeland that provides an earlier grazing period and/or a winter grazing season. For those choosing the last option, cattle generally are shipped to California or Nevada.

Stock count and forage balance tables for representative ranches in the High Desert, Mountain, and North Central Plateau regions are presented in Appendices B-1 to B-3. The

stock count chart shows the numbers of different cattle classes in each month and calculates the forage demanded by the herd. The forage balance table shows the amount of forage available in each month by source of feed. The source of feed has limitations on when it can be used throughout the year. The forage balance table also compares monthly forage demand with availability to identify seasons when there is either a shortage or an excess of feed. Each of the example ranches is based on OSU enterprise budgets described later in this publication and is assumed to be in initial forage balance.

### **Size of Operation**

Most cattle operations in Oregon are small. Nearly 80 percent of all cattle/calf operations had fewer than 50 head in 1995 (Figure 5). Although more numerous, these

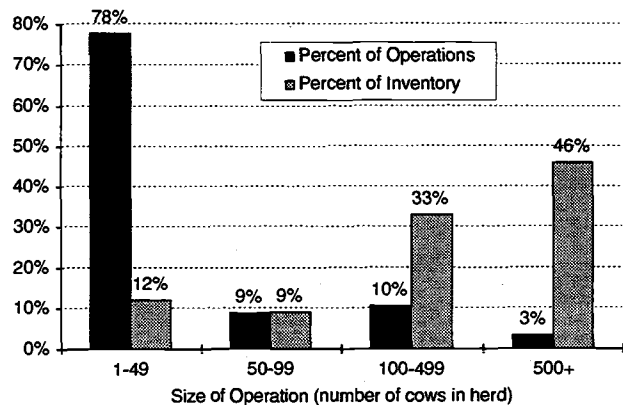


Figure 5. Oregon cattle and calf operations and inventory percentages by size class, 1995 (USDA 1995-96).

operations control only 12 percent of the total cattle in the state (Figure 5). Large operations of 500 head or more hold the largest portion of cattle, 46 percent. Looking at beef producers by herd size reinforces this characteristic of numerous small operations (Figure 6). A larger percentage of total Oregon beef cows are held in herds between 100 and 499 head compared

to cattle/calf operators as a whole (Figure 6 compared to Figure 5).

Sales figures also reflect this structure. More than 60 percent of all beef operations have sales less than \$10,000 annually (Figure 7). Only 9.4 percent of beef operations have marketing sales over \$100,000. Sales by size of beef operation are presented in Table 2.

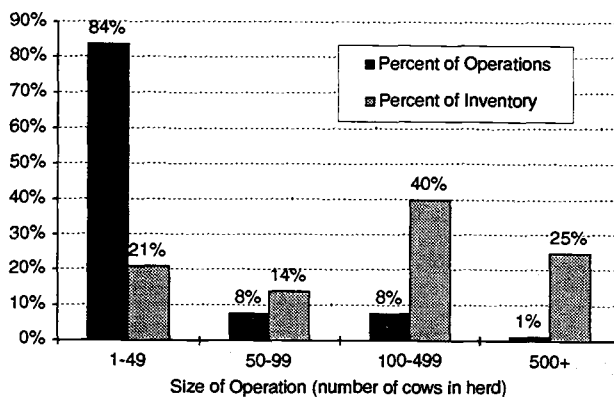


Figure 6. Oregon beef cow operations and inventory percentages by size class, 1995 (USDA 1995-96).

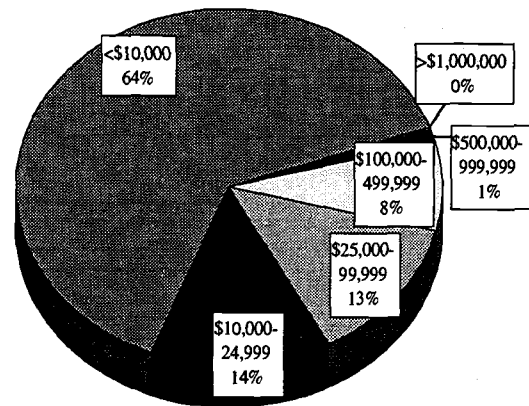


Figure 7. Number of Oregon beef operations by sales value, 1992 (USDC 1993).

Table 2. Number of beef cow operations by herd size and sales class.

Herd Size (head)	Sales Classes (dollars)						Totals
	>1,000,000	500,000-999,999	100,000-499,999	25,000-99,999	10,000-24,999	<10,000	
1-49	14	35	283	658	1,406	8,253	10,649
50-99	4	10	126	473	321	65	999
100-499	14	36	494	616	57	23	1,240
>500	15	39	158	4	1		217
ALL	47	120	1,061	1,741	1,785	8,341	13,105

Source: USDC (1993).

Not all of the agricultural sales shown in Table 2 are from beef cattle alone. For example, a farm with a herd size of 1-49 head with sales over \$1 million receives most of its income from other commodities.

### **Operator Characteristics**

Of all the farms in Oregon, 48 percent are classified as livestock businesses based on the Standard Industrial Classification<sup>1</sup> used by the U.S. Department of Commerce. Of these, 74 percent are classified as beef cattle operations. Cattle and calf sales account for 93 percent of the market value of agricultural products sold by beef cattle operations (U.S. Dept. of Commerce 1993). About 42 percent of all livestock sales in the state come from beef cattle operations.

Less than 50 percent of those classified as beef cattle operators claimed farming as their primary occupation (Figure 8). Of those that claimed farming as their primary occupation, about 36 percent had no off-ranch employment, and another 59 percent worked fewer than 100 days off-ranch.

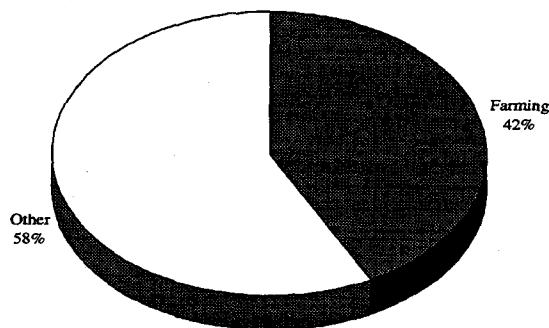


Figure 8. Oregon operator's principal occupation, 1992 (USDC 1993).

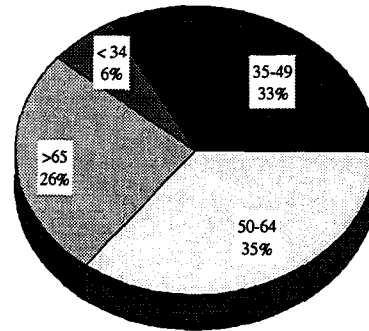


Figure 9. Oregon operator's age distribution in livestock SIC, 1992 (USDC 1993).

Approximately one-third of these operators is in the 50-64-age category (Figure 9). Another third are younger than 50 years of age. In 1992, the average age of a livestock producer was 55 years, up from 50 years in 1982. The average operator had spent 17 years with the current operation. This has increased from 16 years in 1987 and 14 years in 1982.

An overwhelming percentage, more than 91 percent, of livestock operations are managed as sole proprietorships (Figure 10). Corporate ownership accounts for only 2.5 percent, with the majority of the stockholders being family members. In 1992, women operated 10.6 percent of the beef cattle operations.

<sup>1</sup> The Standard Industrial Classification (SIC) codes are used to categorize businesses for reporting purposes.

### Public and Private Land Leasing

The cattle industry in Oregon is highly dependent on grazing public lands to supplement private grazing lands. There were 85,093 cattle authorized to graze on U.S. Forest Service lands in Oregon in 1994, or the equivalent of 456,499 animal unit months (AUM) (U.S. Forest Service 1995). In addition, the Bureau of Land Management (BLM) has authorized 625,003 AUMs under section 3 of the Taylor Grazing Act and 75,449 AUMs under section 15 of that Act for cattle grazing (U.S. Dept. of the Interior 1994). Sources of federal forage are shown in Figure 11. The operations in Oregon with federal permits were estimated to obtain 23 percent of their yearlong forage from the permits as a measure of dependency (USDI 1995). About 11 percent of all cattle forage in Oregon comes from federal lands.

There were 1,395 ranches in Oregon with grazing permits in 1992. This was up from 1,287 in 1982. Of these, 458 held Forest Service permits, 932 held Bureau of Land Management permits, 45 held Indian land permits, and 324 held other permits. The 50 largest BLM permittees use about 42.5 percent of the total authorized BLM AUMs. About half of Oregon's beef cows spend some part of the year on either Forest Service or BLM lands. In eastern Oregon, it is estimated that two-thirds of the beef cows spend some portion of the year on federal lands.

Additionally, private lands are leased for grazing. Private land lease rates are one factor used in establishing the federal grazing

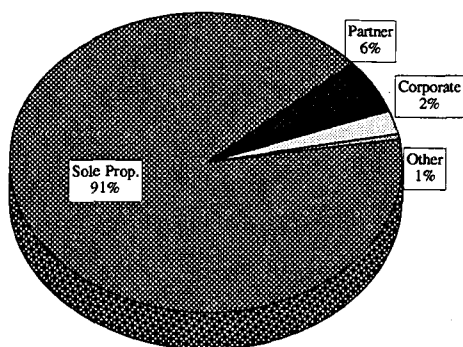


Figure 10. Oregon operation type distribution in livestock SIC, 1992 (USDC 1993).

These figures show that Oregon, like the rest of the nation, has an aging livestock business operator with more time spent on the operation. There also is a large dependency on off-ranch employment, with 74 percent of the operators receiving at least some off-ranch employment.

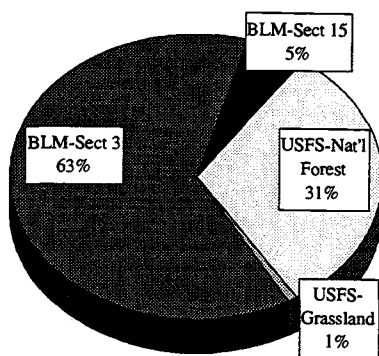


Figure 11. Oregon authorized federal grazing AUMs by type (USDI 1995).

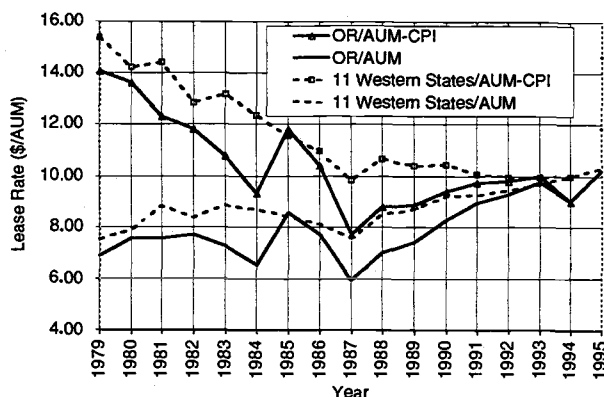


Figure 12. Private land lease rates, Oregon and the 11 western states (USDA 1996). Consumer Price Index, 1994=100.

fee. Figure 12 shows the private land lease rates in Oregon and for the 11 western states. Oregon's rates typically are below the average rate for the 11 western states. When adjusted to 1994 dollars using the consumer price index (CPI), lease rates both in Oregon and in the 11 western states seem to be converging to around \$10/AUM. Private land lease rates are higher than those charged for federal grazing permits. Several studies have shown this difference to be due to differences in the fee and nonfee costs of grazing, permit values, and levels and types of services provided (Obermiller 1992, Bartlett et al. 1994).

### **Financial Characteristics**

Oregon State University has developed representative cow-calf enterprise budgets for three regions in eastern Oregon. The regions used in the budgets were based on differences in resource availability and production cycles expected.

The regions are defined as:

- ◆ North Central Plateau (Wasco, Sherman, Gilliam, Morrow, Umatilla, Jefferson, and Wheeler counties)
- ◆ Mountain (Union, Wallowa, Baker, Grant, and Crook counties)
- ◆ High Desert (Harney, Malheur, Lake, and Klamath counties)

Within each area, there are differences in herd size, operation efficiency, and resource ownership or availability. These budgets are representative of no single operation but of the operation style typical in each area. Although 84 percent of Oregon beef operations have herd sizes less than 50 head, more than 40 percent of the beef in Oregon is in herds of 100-499. Operations with these larger herd sizes also are more dependent on access to public lands. The average herd size in Oregon is around 280 cows. Therefore, we present budgets for a 300- or 350-cow herd size for each area in Tables 3-5.

From the return to management and ownership of land and livestock, the producer still must account for the opportunity cost of owning land and livestock and provide an income to support a family. The \$1,750/cow unit opportunity cost of land ownership assumes a mix of private and public land use. An all-private operation would have a larger opportunity cost associated with it. The High Desert and Mountain regions seem to have positive net returns to management and ownership of land and livestock at the 350- and 300-cow herd size, respectively. However, the North Central Plateau loses \$23 per cow at the 300-cow herd size. The differences in budgets

Table 3. Estimated costs and returns for a 350-cow cow/calf operation in the High Desert region.

<b>GROSS REVENUE</b>					
	<b>Weight</b>	<b>Unit</b>	<b>\$ Unit</b>	<b>\$ Total</b>	<b>\$/Cow</b>
45.0 Cull Cows	9.50	cwt	42.00	17,955	
57.0 Yearling Heifers	8.50	cwt	67.00	32,462	
33.0 Heifer Calves	4.75	cwt	74.00	11,600	
144.0 Steer Calves	5.25	cwt	81.00	61,236	
2.8 Cull Bulls	15.00	cwt	51.00	2,142	
0.5 Horses		each	600.00	300	
<b>Total Gross Revenue</b>				<b>125,694</b>	<b>359.13</b>
<b>CASH COSTS</b>					
Pasture Irrigation and Fertilizer	720	aum	7.00	5,040	
Native Hay	596	ton	60.00	35,760	
Alfalfa Hay	116	ton	85.00	9,860	
Public Land Grazing Fee	1,460	aum	1.83	2,672	
Salt			3.20	1,120	
Minerals			2.40	840	
Fuel and Lube			9.61	3,363	
Interest on Operating Capital			7.73	2,706	
Hired Labor	8 months		1,000.00	8,000	
Repairs: Machinery and Equipment			12.97	4,539	
Fence Repair Materials			2.86	1,000	
Supplies			3.00	1,050	
Utilities			2.57	900	
Vet & Medicine			10.00	3,500	
Brand Inspection			1.50	525	
Bull Purchase	2.8		2,000.00	5,600	
Horse Purchase	0.5		2,000.00	1,000	
Marketing Fees			10.83	3,791	
Accounting			3.43	1,201	
Legal and Related Expenses			2.86	1,001	
Miscellaneous			4.29	1,502	
Family Labor				12,000	
Machinery and Equipment				2,369	
Property Taxes				2,500	
<b>Total Cash Costs</b>				<b>111,836</b>	<b>319.53</b>
<b>NET PROJECTED RETURNS OVER VARIABLE AND CASH FIXED COSTS</b>				<b>13,858</b>	<b>39.59</b>
Depr. & Int. on Mach. & Equip.				13,387	
<b>NET PROJECTED RETURNS TO MGT &amp; OWNERSHIP OF LAND &amp; LIVESTOCK</b>				<b>471</b>	<b>1.34</b>
Opportunity Cost of Land Ownership (\$1,750/cow unit @ 2.5%)				15,312	
Opportunity Cost of Livestock Ownership			16.48	2,500	
<b>PROJECTED RETURNS NET OF ALL ECONOMIC COSTS</b>				<b>(17,341)</b>	<b>(49.55)</b>
<b>PROJECTED RETURNS TO MGT, LAND &amp; LIVESTOCK, AND FAMILY LABOR</b>				<b>12,471</b>	<b>35.63</b>

Table 4. Estimated costs and returns for a 300-cow cow/calf operation in the Mountain region.

<b>GROSS REVENUE</b>					
	<b>Weight</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>\$ Total</b>	<b>\$/Cow</b>
45.0 Cull Cows	11.00	cwt	40.00	19,800	
12.0 Yearling Heifers	8.00	cwt	66.00	6,336	
73.0 Heifer Calves	5.25	cwt	72.00	27,594	
133.0 Steer Calves	5.75	cwt	79.00	60,415	
3.1 Cull Bulls	18.00	cwt	49.00	2,734	
0.5 Horses		each	300.00	150	
<b>Total Gross Revenue</b>				<b>117,029</b>	<b>334.37</b>
<b>CASH COSTS</b>					
Pasture Irrigation and Fertilizer	0	aum	2.50	-	
Native Hay	529	ton	60.00	31,740	
Alfalfa Hay	120	ton	85.00	10,200	
Public Land Grazing Fee	1,285	aum	1.83	2,352	
Salt			3.20	960	
Minerals			2.40	720	
Fuel and Lube			9.49	2,847	
Interest on Operating Capital			7.73	2,319	
Hired Labor	6 months		1,500	9,000	
Repairs: Machinery and Equipment			11	3,449	
Fence Repair Materials			3	1,000	
Supplies			3	1,000	
Utilities			8	2,400	
Vet & Medicine			14	4,251	
Brand Inspection			2	495	
Bull Purchase	3.1		2,000	6,200	
Horse Purchase	0.5		1,500	750	
Marketing Fees			11.65	3,495	
Accounting			4.47	1,341	
Legal and Related Expenses			2.86	858	
Miscellaneous			5.00	1,500	
Family Labor				13,350	
Machinery and Equipment				1,606	
Property Taxes				1,874	
<b>Total Cash Costs</b>				<b>103,706</b>	<b>345.69</b>
<b>NET PROJECTED RETURNS OVER VARIABLE AND CASH FIXED COSTS</b>				<b>13,324</b>	<b>44.41</b>
Depr. & Int. on Mach. & Equip.				13,966	
<b>NET PROJECTED RETURNS TO MGT &amp; OWNERSHIP OF LAND &amp; LIVESTOCK</b>				<b>(642)</b>	<b>(2.14)</b>
Opportunity Cost of Land Ownership (\$1,750/cow unit @ 2.5%)				13,125	
Opportunity Cost of Livestock Ownership			12.3	3,690	
<b>PROJECTED RETURNS NET OF ALL ECONOMIC COSTS</b>				<b>(17,457)</b>	<b>(58.19)</b>
<b>PROJECTED RETURNS TO MGT, LAND &amp; LIVESTOCK, AND FAMILY LABOR</b>				<b>12,708</b>	<b>42.36</b>

Table 5. Estimated costs and returns for a 300-cow cow/calf operation in the North Central Plateau region.

<b>GROSS REVENUE</b>					
	<b>Weight</b>	<b>Unit</b>	<b>\$/Unit</b>	<b>\$ Total</b>	<b>\$/Cow</b>
44.0 Cull Cows	10.75	cwt	41.00	19,393	
14.0 Yearling Heifers	7.25	cwt	67.00	6,801	
62.0 Heifer Calves	5.00	cwt	72.00	22,320	
127.0 Steer Calves	5.45	cwt	79.00	54,680	
3.1 Cull Bulls	16.25	cwt	50.00	2,519	
0.5 Horses		each	300.00	150	
<b>Total Gross Revenue</b>				<b>105,862</b>	<b>302.46</b>
<b>CASH COSTS</b>					
Pasture Irrigation and Fertilizer	0	aum	2.50	-	
Native Hay	0	ton	60.00	-	
Alfalfa Hay	434	ton	75.00	32,550	
Public Land Grazing Fee	1101	aum	1.83	2,015	
Salt			3.20	960	
Minerals			2.40	720	
Fuel and Lube			10.31	3,093	
Interest on Operating Capital			9.43	2,829	
Hired Labor	3 months		1,500.00	4,500	
Repairs: Machinery and Equipment			12.23	3,669	
Fence Repair Materials			5.33	1,599	
Supplies			4.00	1,200	
Utilities			8.00	2,400	
Vet & Medicine			14.17	4,251	
Brand Inspection			1.56	468	
Bull Purchase	3.1		2,000.00	6,200	
Horse Purchase	0.5		1,500.00	750	
Marketing Fees			10.63	3,189	
Accounting			4.47	1,341	
Legal and Related Expenses			2.86	858	
Miscellaneous			5.00	1,500	
Family Labor				20,000	
Machinery and Equipment				5,325	
Property Taxes				968	
<b>Total Cash Costs</b>				<b>100,385</b>	<b>334.62</b>
<b>NET PROJECTED RETURNS OVER VARIABLE AND CASH FIXED COSTS</b>				<b>5,477</b>	<b>18.26</b>
Depr. & Int. on Mach. & Equip.				13,747	
<b>NET PROJECTED RETURNS TO MGT &amp; OWNERSHIP OF LAND &amp; LIVESTOCK</b>				<b>(8,270)</b>	<b>(27.57)</b>
Opportunity Cost of Land Ownership (\$1,750/cow unit @ 2.5%)				13,125	
Opportunity Cost of Livestock Ownership			14.08	4,224	
<b>PROJECTED RETURNS NET OF ALL ECONOMIC COSTS</b>				<b>(25,619)</b>	<b>(85.40)</b>
<b>PROJECTED RETURNS TO MGT, LAND &amp; LIVESTOCK, AND FAMILY LABOR</b>				<b>11,730</b>	<b>39.10</b>



are found in both costs and revenues. The total revenue per cow in this region is about \$36 less than in the Mountain region and about the same as in the High Desert region. The total costs are about \$10 per cow lower than in the Mountain region but \$18 per cow higher than in the High Desert region. Therefore, both lower revenues and higher costs cause the negative return estimated for the North Central Plateau region. Both of these factors can be linked partially to location. It was assumed that this area has no native hay production, and producers are required to buy alfalfa hay. Therefore, the winter feeding costs were higher than in other regions, the machinery equipment insurance and taxes were much higher, and the market for cattle generally experienced lower prices. The returns from these and other size operations are summarized in Table 6. Budgets for other herd sizes are available from the Oregon State University Extension Service. Note that returns for all areas were negative for a 50-cow herd size. The 80 percent of beef operations with herd sizes less than 50 cows probably are not getting a return on their equity that is competitive with returns from other

opportunities. Even those returns that are positive are not necessarily competitive with the next best alternative investment. The cattle industry, as we have seen, fluctuates tremendously in number of cattle and value. The return from this type of operation generally leaves little financial margin within which the producer can operate.

It seems apparent that those operators that have negative returns to management and ownership of land and livestock are supporting their activities with other sources of income. At this point, we do not know whether these sources are other agricultural enterprises, outside investments, or outside employment. A recent study in New Mexico suggests that the impact of changes in cost and price are not necessarily greatest on small ranches with negative incomes, but rather on those with high debt (Torell and Drummond 1997). What this implies is that changing economic and policy decisions are not likely to affect small ranchers since they are responding to incentives other than profit. The larger ranches are more likely to make adjustments based on changing conditions.

Table 6. Summary of estimated net returns to management and ownership of land and livestock for three regions of Oregon.

<i>Net Returns to Management and Ownership of Land and Livestock</i>			
<i>Region</i>	<i>50-cow Herd Size</i>	<i>300-cow Herd Size (350 for High Desert)</i>	<i>500-cow Herd Size (750 for North Central)</i>
<b>High Desert</b>		(Dollars)	
Total	- 9,140	2,586	10,647
Per Cow	- 182.80	7.39	21.29
<b>Mountain</b>			
Total	- 15,804	1,215	18,023
Per Cow	- 316.08	4.05	36.05
<b>North Central Plateau</b>			
Total	- 20,348	- 13,747	21,460
Per Cow	- 406.96	- 45.82	28.61

## The Relative Importance of the Beef Industry in Oregon

There are numerous ways to measure the importance of Oregon's beef industry. These measures can be stratified into national, regional, and state levels. This section emphasizes the economic importance of Oregon's beef industry by using measurements such as employment and income.

### National Perspective

Oregon's population is growing, particularly in the metropolitan regions. This area tends to be a corridor from Portland south to Eugene. The populations of a few cities in predominantly recreational public land areas, such as Bend, also are growing. Oregon's population grew by 8.4 percent between 1990 and 1994 (State of Oregon 1996). The city of Portland saw a 12.8 percent increase in the same time period. The urban population in

Oregon accounted for 70.5 percent of the total population in 1990 (U.S. Dept. of Commerce 1996). The majority of the new population is employed in nonmanufacturing positions. Non-manufacturing jobs saw the largest job gains from 1985 to 1993-94 at 32 percent. The non-manufacturing sector now provides 83 percent of the jobs in Oregon. The economy of Oregon has outperformed the nation's economy every year since 1986 (State of Oregon 1996).

Growth has come with diversification and expansion in high technology jobs. A summary of important characteristics of Oregon relative to the nation is presented in Table 7. Employment and average payroll in 14 industries in Oregon is presented in Table 8. Agriculture as a whole ranked as the third largest employer behind forest products and tourism, although the gap is closing in recent years. Average payroll, however, ranks near the bottom of the 14 industries, generally only higher than tourism.

Table 7. Important characteristics of Oregon.

<i>Characteristics</i>	<i>Value</i>	<i>Rank Among States</i>
Resident Population	3,086,000	27
Rural Population	839,000	27
Labor Force	1,364,000	28
Land Area (1994, sq. miles)	96,002	10
Non-Federal Owned Land (1991, sq. miles)	45,794	27
Per-capita Income (1994)	20,419	27
State of Origin for Exports (1994, millions of dollars)	6,103	21

Source: Statistical Abstract of the U.S. 1996.

Table 8. Total employment and average payroll in 14 Oregon industries.

Total Employment in Oregon's 14 Key Industries								
	1987	1988	1989	1990	1991	1992	1993	1994
Aerospace	2,428	3,053	3,891	4,103	3,972	3,963	3,976	3,745
Agriculture	46,983	51,307	51,617	54,613	56,712	57,126	58,884	60,971
Biotechnology	3,055	NA	NA	NA	NA	NA	568	555
Environmental Technology	8,835	15,927	17,638	19,509	20,019	20,722	21,978	23,948
Film and Video	18	480	394	501	429	674	551	702
Fisheries	2,529	2,721	2,494	2,506	2,580	2,738	2,647	2,544
Forest Products	82,277	83,978	82,944	80,203	72,388	70,290	69,283	70,572
Graphic Communications	12,444	15,790	16,165	17,509	17,319	17,445	18,152	19,220
High Technology	25,604	30,821	32,200	34,283	35,353	34,600	35,722	38,100
Metals	20,376	22,266	24,382	23,730	23,003	22,368	22,275	23,523
Plastics	510	4,648	4,926	5,006	4,701	5,072	5,793	6,493
Professional Services	9,473	21,552	23,255	24,524	24,133	28,288	26,204	27,083
Software	5,252	5,939	6,934	8,186	7,414	7,705	8,756	9,875
Tourism	106,297	NA	NA	NA	57,726	59,177	61,416	63,635
Average Payroll in Oregon's 14 Key Industries								
	1987	1988	1989	1990	1991	1992	1993	1994
Aerospace	31,250	30,615	28,073	29,521	31,100	33,802	33,070	32,742
Agriculture	14,155	14,515	14,998	15,908	16,461	17,093	17,175	17,740
Biotechnology	22,796	24,149	25,090	25,939	27,323	29,469	29,626	34,632
Environmental Technology	19,223	25,846	27,173	28,569	29,560	31,524	32,151	32,818
Film and Video	33,945	19,849	24,959	24,818	28,204	30,198	31,569	30,993
Fisheries	19,286	19,328	17,493	18,986	17,362	18,257	17,524	18,408
Forest Products	24,292	25,089	25,816	26,152	27,137	28,831	29,486	30,316
Graphic Communications	19,839	21,436	22,458	24,780	24,809	26,321	27,276	27,969
High Technology	27,650	29,029	29,620	31,384	34,145	37,192	39,353	41,942
Metals	26,035	26,762	28,735	29,534	30,929	31,171	31,128	32,492
Plastics	22,373	21,172	2,210	22,995	24,365	24,937	26,168	26,687
Professional Services	25,846	27,784	28,680	30,231	31,736	30,682	34,994	36,095
Software	28,557	31,577	33,864	37,238	37,247	40,813	41,278	42,912
Tourism	7,253	8,184	8,615	9,451	11,909	12,367	12,537	NA

Source: Oregon Business Media 1996 from Internet page <http://www.oregonbusiness.com>

In agriculture, Oregon ranks highest in the nation for its production of many high-valued, horticultural crops, such as peppermint, grass seed, and hazelnuts. Field crops are important to the state of Oregon but are relatively small percentages of the nation's field crop production. Oregon ranks 13th in wheat production, 14th in oats, 8th in barley, and 11th in sugar beets. Total agriculture and fishery production was valued at \$3.3 billion in 1994. Cattle and calves accounted for \$368 million of this value. Cattle and calf production was the state's second largest commodity in 1994 by value. In the nation, however, Oregon ranks 26th in cattle and calf production with 1.4 percent of the nation's cattle and calf production. The percentage of the nation's beef cattle in Oregon is slightly higher at 1.7 percent (Figure 13). While beef and dairy cows were roughly equal in the state in the 1920s (Figure 14), beef cows have predominated since the 1960s. The percent of Oregon beef operations and inventories by size class (Figure 6) follows a pattern similar to that of U.S. beef operations (Figure 15).

### **Regional Perspective**

Cattle and beef cow numbers have been increasing in the 11 western states (Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming) since the late 1800s. The western region produced more than 20 percent of the U.S. beef cows and only slightly less of the total cattle and calves in the early 1990s. This

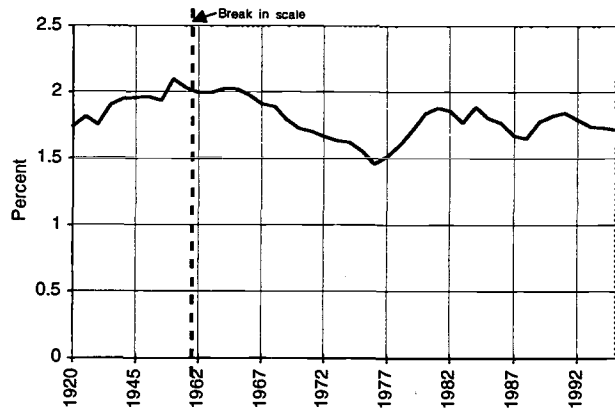


Figure 13. Percent of U.S. beef cows in Oregon (USDA OASS 1996, USDA NASS 1996). Note: Five-year intervals from 1920-1960 and annual intervals from 1960-1995.

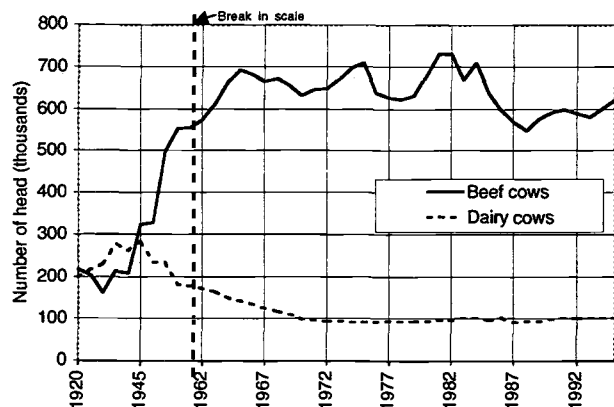


Figure 14. Number of beef and dairy cows in Oregon (USDA OASS 1996). Note: Five-year intervals from 1920-1960 and annual intervals from 1960-1995.

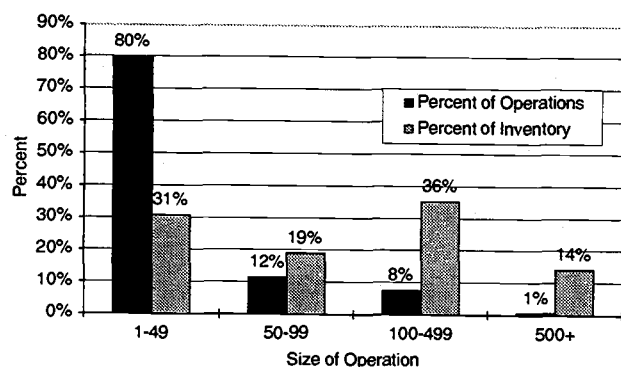


Figure 15. U.S. beef cow percent of operations and inventory by herd size, 1995 (USDA 1995-96).

percentage has dropped slightly since then (Figure 16). Oregon provided more than 10 percent of the western region cattle and calves until the late 1800s (Figure 17). Oregon has provided 7-9 percent of western cattle/calves and beef cows since then.

A large majority of western cattle is grazed on public lands. Only 6 percent of the AUMs on BLM and USFS land are found outside the western region (U.S. Dept. of the Interior 1995). Within the region, more than

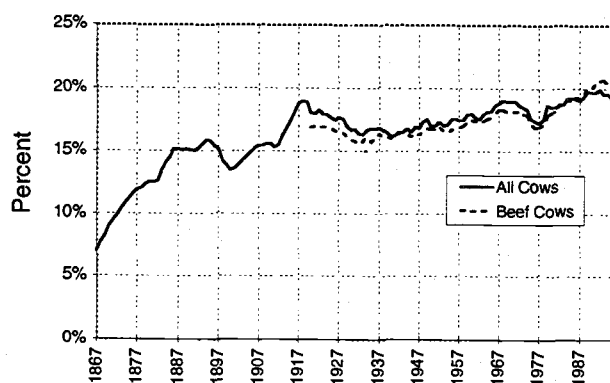


Figure 16. Total cattle and beef cows in the west as a percent of the U.S. (USDA NASS 1996).

15,000,000 AUMs are grazed on public lands. Of the beef cattle producers in the western region, 22 percent have federal grazing permits (Table 9). New Mexico and Wyoming have the greatest number of AUMs on public grazing lands. Within the western region, Oregon ranks eighth in federal AUMs grazed (Figure 18).

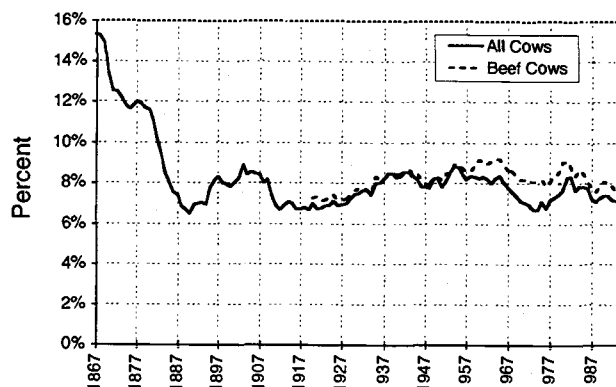


Figure 17. Oregon cattle and beef cows as a percent of western cattle (USDA NASS 1996).

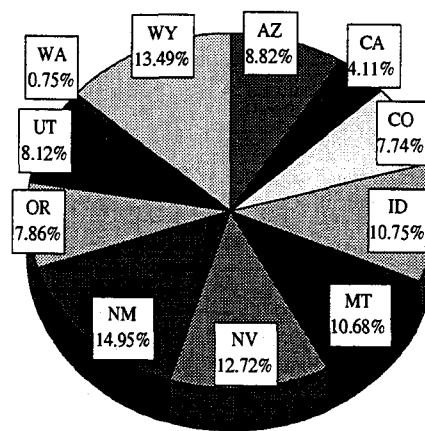


Figure 18. Percent of western AUMs on Bureau of Land Management and U.S. Forest Service land by state (USDI 1995).

Table 9. Beef cattle producers and federal grazing permits in the U.S. in 1993.

Region	Beef Cattle	Producers	Producers with Federal Permits/Leases*	Percent of Producers with Federal Grazing Permits
11-State Western Region	1,602,000	96,700	21,132	22.0
5-State Central West Region	22,090,000	137,500	952	0.7
Texas	13,820,000	125,000	163	0.1
Totals: 17 Western States	51,930,000	359,200	22,247	6.0
Eastern Region	34,724,000	547,500	570	0.1
Totals: 48 Contiguous States	86,654,000	906,700	22,817	3.0

Source: *Rangeland Reform '94: Draft Environmental Impact Statement, 1994.*

\*Includes permits/leases held by grazing associations comprised of multiple individual producers.

The majority of the public land AUMs are on BLM Section 3 lands. In Oregon, about 23 percent of beef cattle forage comes from federal lands. Oregon has more public grazing, by AUMs, than Washington and California and slightly less than Montana.

Statistics show that beef production is shifting to other areas of the U.S., in particular to the central high plains, with a concurrent increase in the percent of U.S. calves produced

in the western region. These calves are raised for a period of time on rangeland and then shipped to other states for finishing. This shift is due in part to the proximity to grain producing areas for feed and in part to reductions in available grazing lands in the western region (lost to both development and reductions in federal forage supply). The cost of feeding calves to the final product has become a limiting factor for western beef producers.

## Beef Production in the Oregon Economy

The beef industry in Oregon has two important roles. The first is the role within the state economy; the second the role in the farm economy. Cattle and calves, as well as livestock products, have been a significant portion of total commodity receipts in the state of Oregon (Figure 19). However, since the late 1980s, both have declined as a percent of total

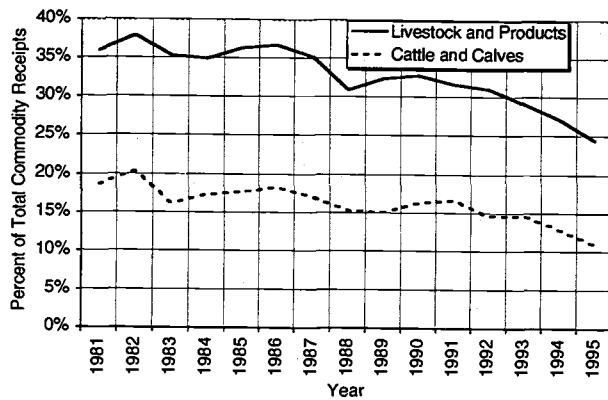


Figure 19. Oregon cattle and calves and livestock product receipts as a percent of total commodity receipts (USDA NASS 1996).

commodity receipts. Livestock products were nearly 40 percent of the total commodity receipts in the early 1980s, but now are fewer than 25 percent. (This figure may be somewhat misleading since in recent years farm forestry has been included as a type of agricultural activity.) Cattle and calves, which accounted for more than 20 percent of the state commodity receipts in 1982, have fallen to only slightly

more than 10 percent. These figures are reflective of recent falling cattle prices as well as declines in the number of cattle and calves in the state's inventory. Livestock marketing receipts to farms in Oregon have stayed fairly constant in real value (adjusted for inflation) since the 1950s, but have been declining since the 1980s (Figure 20). Crop marketing receipts have been outperforming livestock most recently. Together these figures show an

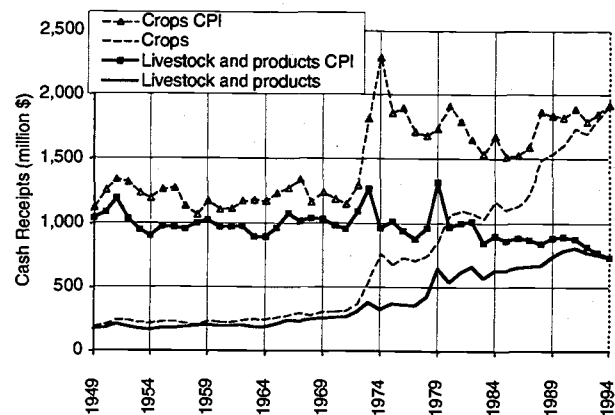


Figure 20. Oregon farm cash receipts, nominal and adjusted for inflation (USDA NASS 1996). Consumer Price Index, 1994=100.

overall improving **gross** farm income (Figure 21) but do not reflect the joint rise in expenses. Figure 22 depicts the change in feed and livestock purchase expenses in the early 1980s and the more recent increases in feed costs. The resulting inflation-adjusted net incomes of Oregon farms generally are falling from 1949 to 1994 (Figure 23).



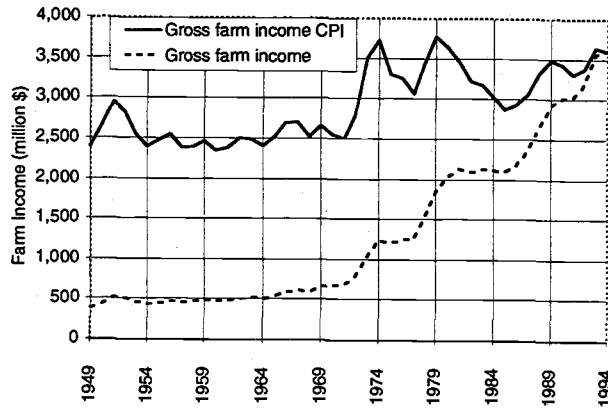


Figure 21. Oregon gross farm income, nominal and inflation-adjusted (USDA NASS 1996). Consumer Price Index, 1994=100.

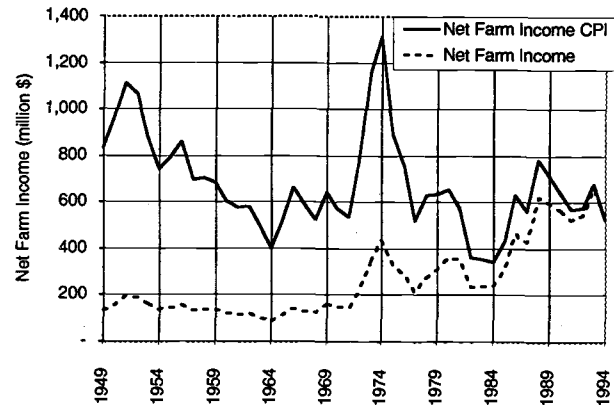


Figure 23. Oregon net farm income, nominal and inflation-adjusted (USDA NASS 1996). Consumer Price Index, 1994=100.

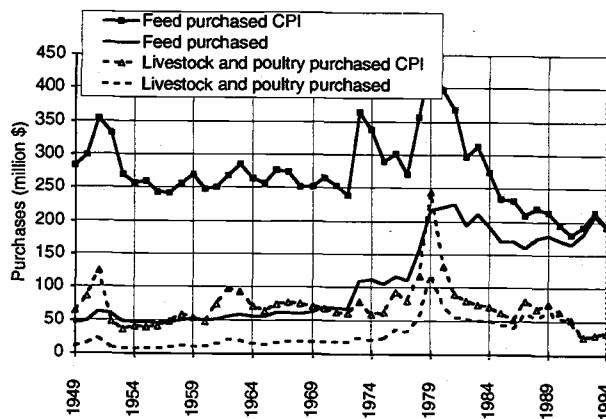


Figure 22. Oregon production expenses, nominal and inflation-adjusted (USDA NASS 1996). Consumer Price Index, 1994=100.

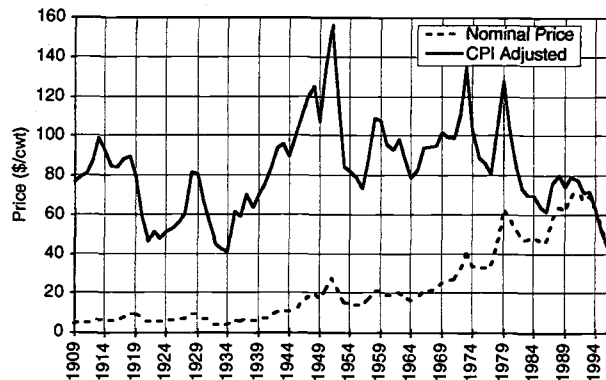


Figure 24. Average annual Oregon beef prices, nominal and inflation-adjusted (USDA 1996). Consumer Price Index, 1994=100.

Prices for Oregon cattle reflect the national cycle of peaks and troughs. Oregon beef prices have an overall upward trend in nominal prices (Figure 24). When adjusted for inflation, beef prices are roughly comparable to what they were at the turn of the

century. Currently, the beef industry appears to be in a price trough which, based on historical price trends, may be expected to rise in the near future. These fluctuations usually are linked to the time it takes producers to expand and contract their herd sizes. The individual

price trends of cows, calves, and steers and heifers follow the same basic pattern as beef prices (Figure 25). Cow prices historically are less than both calves, and steers and heifers. Calf prices are the highest.

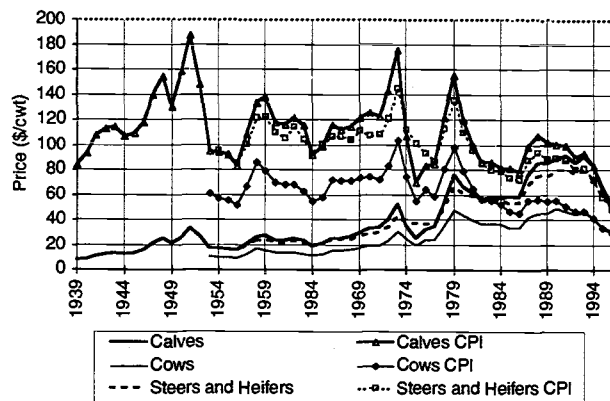


Figure 25. Annual average Oregon cattle prices, nominal and inflation adjusted (USDA NASS 1996). Consumer Price Index, 1994=100.

### County Perspectives

The cattle industry in Oregon is scattered throughout the entire state. The dairy industry tends to be centered in the lush pastures of the northern coast, particularly Tillamook County. The beef industry concentration is in the central and eastern portions of the state. The number one beef cattle county, by number of head and cattle/calf sales, is Malheur County in the High Desert region of southeast Oregon. This region contains 4 counties ranked in the top 10 for number of beef cows and cattle/calf sales. Table 10 summarizes state cattle/calf sales by county and ranks them. The Mountain Region consists

of only 4 counties, but 3 of these are ranked in the top 10 for beef cow numbers and cattle/calf sales. The North Central Plateau, just south of the Columbia River, is the other large area for beef production. Among the 8 counties in this region are found the second and third highest cattle/calf sales counties, and 4 of the counties rank in the top 20 for beef numbers.

A summary of grazing permits allocated in Oregon is presented in Table 11 by county and region. The USFS grazing permits and Taylor Grazing Act permits are heavily concentrated in the Mountain and High Desert regions. These areas contain most of the larger ranches, greater than 500 head, as mentioned previously. In turn, the economics of these cattle enterprises are more heavily dependent on the access of public grazing lands for part of their annual feed supply.

### Livestock Sector Multipliers

Another method used to evaluate the role of the beef industry in Oregon is to examine the interrelationships between the livestock sector and other sectors of industry in the state; that is, the extent to which one sector draws on another for inputs. For example, producers buy supplies from local agricultural service dealers, who in turn buy from wholesalers. A change in any one of these sectors will have some impact on all the other sectors.

To measure the magnitude of these changes an input-output model is used. One of the steps in constructing an input-output model is the estimation of output multipliers. Multipliers measure the change in spending within

Table 10. Oregon cattle and calf numbers and sales by county (1987 and 1992 values from USDC 1993; 1995 values from OSU 1996).

	Cattle and Calves								Beef Cows			
	Sales (\$1,000)											
	Number			1992		1987		Number			Rank	
	Farms	1995	1992	Value	Rank	Value	Rank	Farms	1995	1992		
Willamette Valley												
Benton	286	10,800	10,362	2,236	29	1,884	30	223	3,500	3,513	27	
Clackamas	1,413	28,400	29,635	6,345	19	6,273	18	1,057	10,300	10,047	19	
Lane	1,047	38,000	37,665	12,594	14	9,310	14	829	13,600	13,777	15	
Linn	1,155	34,600	34,070	7,504	18	7,835	16	875	10,600	11,025	18	
Marion	973	46,500	44,462	8,045	17	8,367	15	619	7,200	7,074	21	
Multnomah	189	3,900	4,182	996	35	1,210	34	145	1,600	Withheld	NR	
Polk	496	17,800	17,952	4,712	26	4,226	25	354	3,900	3,696	25	
Washington	540	17,500	17,060	2,941	28	3,524	26	353	3,400	3,303	29	
Yamhill	702	23,800	25,087	5,351	24	4,364	24	480	4,900	4,820	23	
SUBTOTAL	6,801	221,300	220,475	50,724		46,993		4,935	59,000	57,255		
Coast												
Clatsop	186	9,300	9,013	1,834	31	1,635	31	154	3,500	3,500	28	
Columbia	486	15,000	15,470	3,570	27	3,012	28	407	5,500	5,655	22	
Coos	486	28,900	27,816	6,343	20	5,429	20	376	11,000	11,102	17	
Curry	103	7,700	7,310	1,631	33	1,401	33	89	3,900	3,840	24	
Lincoln	202	6,800	7,313	1,532	34	1,131	35	185	3,300	3,615	26	
Tillamook	299	46,000	44,265	4,867	25	3,163	27	96	1,000	1,023	31	
SUBTOTAL	1,762	113,700	111,187	19,777		15,771		1,307	28,200	28,735		
Southwest												
Douglas	1,193	53,700	55,186	19,626	10	14,218	12	937	23,100	21,867	10	
Jackson	955	39,200	40,053	11,095	15	10,446	13	742	19,000	18,675	13	
Josephine	299	9,900	10,274	1,907	30	2,575	29	209	2,200	2,051	30	
SUBTOTAL	2,447	102,800	105,513	32,628		27,239		1,888	44,300	42,593		
North Central Plateau												
Gilliam	84	18,600	17,804	5,757	22	6,679	17	79	9,500	Withheld	NR	
Hood River	112	2,100	2,411	568	36	595	36	81	800	Withheld	NR	
Morrow	214	51,600	35,228	57,468	2	53,422	2	187	19,600	20,119	12	
Sherman	83	8,100	9,105	1,818	32	1,515	32	78	3,800	Withheld	NR	
Umatilla	675	78,500	76,730	46,889	3	46,029	3	508	32,100	31,998	6	
Wasco	230	32,000	32,567	8,795	16	5,952	19	202	16,500	16,979	14	
Jefferson	161	26,300	28,125	13,493	13	5,411	21	135	10,300	Withheld	NR	
Wheeler	113	21,700	21,274	5,868	21	4,477	23	97	12,500	12,530	16	
SUBTOTAL	1,672	238,900	223,244	140,656		124,080		1,367	105,100	81,626		
Mountain												
Baker	463	90,900	93,418	29,578	6	33,237	4	371	42,100	45,257	4	
Union	426	40,300	51,380	25,607	7	25,607	7	360	17,000	20,149	11	
Wallowa	326	59,900	61,087	20,238	9	16,753	9	290	28,100	30,892	8	
Grant	300	56,800	56,918	15,330	12	15,290	11	262	28,100	31,292	7	
SUBTOTAL	1,515	247,900	262,803	90,753		90,887		1,283	115,300	127,590		
High Desert												
Crook	354	53,700	54,799	17,695	11	16,430	10	303	26,100	26,717	9	
Deschutes	627	20,700	20,660	5,494	23	5,020	22	465	10,000	9,065	20	
Harney	351	108,400	99,310	30,718	5	25,983	6	319	34,100	60,422	2	
Klamath	635	105,400	98,756	32,720	4	29,612	5	528	45,100	41,915	5	
Lake	264	81,600	87,219	24,816	8	23,622	8	239	42,600	47,161	3	
Malheur	660	175,600	181,478	83,544	1	54,311	1	471	70,200	75,424	1	
SUBTOTAL	2,231	369,800	360,744	111,443		100,667		1,854	157,900	185,280		
Oregon Total	17,088	1,470,000	1,465,444	483,601		459,946		13,105	610,000	629,625		
Withheld										106,546		

Table 11. Type and percent of permit types by region and county, 1992 (USDC 1993).

<b>Region and County</b>	<b>USFS</b>	<b>BLM</b>	<b>Indian</b>	<b>Other</b>
<b>Willamette Valley</b>				
Benton	0.0%	0.0%	0.0%	1.2%
Clackamas	0.0%	0.2%	0.0%	0.6%
Lane	1.3%	0.2%	0.0%	1.2%
Linn	0.2%	0.2%	2.2%	3.7%
Multnomah	0.0%	0.1%	0.0%	0.9%
Polk	0.2%	0.2%	0.0%	0.3%
Washington	0.0%	0.2%	0.0%	0.6%
Yamhill	0.0%	0.0%	0.0%	1.2%
<b>Regional Total</b>	<b>1.7%</b>	<b>1.2%</b>	<b>2.2%</b>	<b>9.9%</b>
<b>Coast</b>				
Columbia	0.0%	0.3%	0.0%	0.6%
Coos	0.7%	0.4%	0.0%	0.9%
Curry	1.1%	0.1%	0.0%	0.9%
Lincoln	2.4%	0.2%	0.0%	0.3%
Tillamook	0.9%	0.0%	20.0%	0.3%
<b>Regional Total</b>	<b>5.0%</b>	<b>1.1%</b>	<b>20.0%</b>	<b>3.1%</b>
<b>Southwest</b>				
Douglas	1.3%	1.9%	4.4%	0.9%
Jackson	4.8%	5.8%	0.0%	3.4%
Josephine	0.7%	0.1%	0.0%	0.0%
<b>Regional Total</b>	<b>6.8%</b>	<b>7.8%</b>	<b>4.4%</b>	<b>4.3%</b>

Table 11 (continued). Type and percent of permit types by region and county, 1992 (USDC 1993).

Region and County	USFS	BLM	Indian	Other
<b>North Central Plateau</b>				
Gilliam	0.7%	1.4%	0.0%	1.9%
Jefferson	2.6%	1.4%	2.2%	2.2%
Morrow	4.1%	0.6%	0.0%	2.8%
Sherman	0.2%	1.8%	0.0%	1.2%
Umatilla	4.4%	1.4%	0.0%	5.2%
Wasco	1.3%	2.8%	0.0%	3.1%
Wheeler	3.3%	3.5%	0.0%	1.5%
<b>Regional Total</b>	<b>16.6%</b>	<b>13.0%</b>	<b>2.2%</b>	<b>17.9%</b>
<b>Mountain</b>				
Baker	9.0%	12.8%	0.0%	4.6%
Grant	15.3%	6.8%	0.0%	4.0%
Union	2.6%	1.3%	0.0%	8.3%
Wallowa	6.3%	1.7%	6.7%	7.1%
<b>Regional Total</b>	<b>33.2%</b>	<b>22.5%</b>	<b>6.7%</b>	<b>24.1%</b>
<b>High Desert</b>				
Crook	6.3%	5.8%	0.0%	2.5%
Harney	11.1%	17.1%	57.8%	16.4%
Deschutes	2.0%	2.9%	0.0%	3.1%
Klamath	5.2%	5.5%	2.2%	6.5%
Lake	9.8%	6.3%	2.2%	5.2%
Malheur	2.2%	16.7%	2.2%	6.5%
<b>Regional Total</b>	<b>36.7%</b>	<b>54.3%</b>	<b>64.4%</b>	<b>40.1%</b>
<b>OREGON TOTAL*</b>	<b>100.0%</b>	<b>99.9%</b>	<b>100.0%</b>	<b>99.4%</b>

\* Does not add to 100% due to rounding errors.

the local economy resulting from a change in demand for goods. An output multiplier indicates the change in sales (or output) in the local economy resulting from a change in demand from outside the economy for a given sector's output. For example, if a government agency were trying to determine in which sector of an economy to spend an additional dollar, comparison of output multipliers would show where this spending would have the greatest impact in terms of total dollar value generated throughout the economy.

In the following section, input levels (forage) are changed. These are converted to outputs in final demand for products by using forage balance tables to adjust herd size to available forage recognizing seasonal forage use. Because adjustments can be made, a 25 percent reduction in forage does not necessarily translate into a 25 percent reduction in final output. In most cases, the change in final output will be less than the change in input level.

Several output models have been constructed for counties throughout Oregon using primary data. The livestock output multipliers for three counties, which are representative of the three major beef industry areas of Oregon, are presented here. Malheur County is in the High Desert region (Figure 26), Grant County is in the Mountain region (Figure 27), and Morrow County is in the North Central Plateau region (Figure 28). Figures 26-28 compare the output multipliers of a selected set of sectors in each county economy. Complete listings of the output multipliers for each

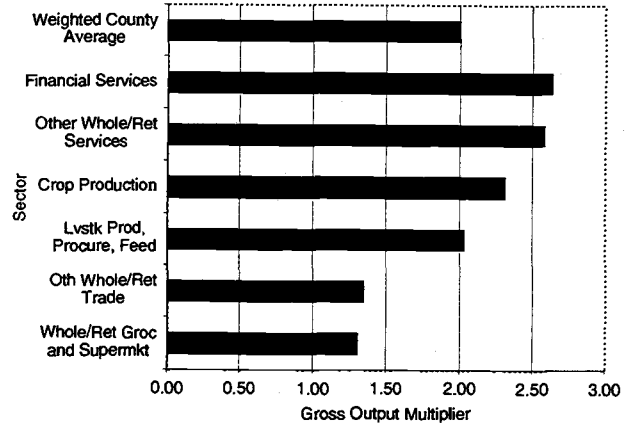


Figure 26. Gross output multipliers for selected sectors of the Malheur County, Oregon economy, 1991 (Obermiller et al. 1993). See Appendix A-1 for complete listing.

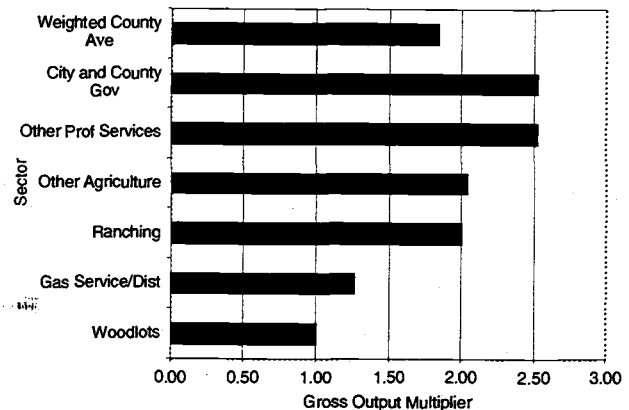


Figure 27. Gross output multipliers for selected sectors of the Grant County, Oregon economy, 1991 (Obermiller and Stringham 1993). See Appendix A-2 for a complete listing.

county are provided in Appendix A. Note that output multipliers cannot be compared across counties because the aggregated sectors are not the same for each county, and these multipliers

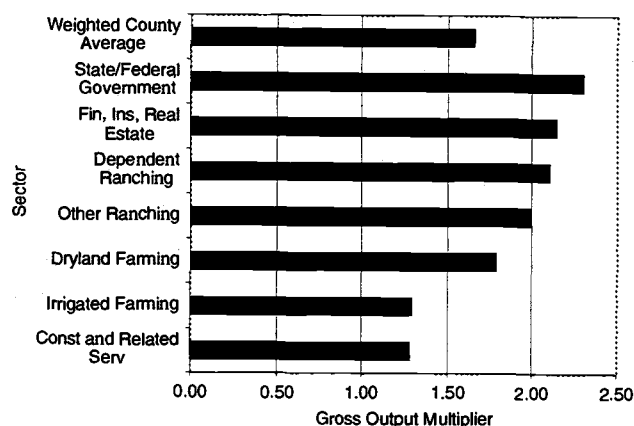


Figure 28. Gross output multipliers for selected sectors of the Morrow County, Oregon economy, 1993 (Obermiller and Glascock 1995). See Appendix A-3 for a complete listing.

do not indicate any rank of total economic contribution to the economy.

The gross output multipliers for livestock-related sectors, in all three counties, are at least 2 or above. This means that the value of business activity induced from each \$1 of

final demand sales in these livestock sectors is at least \$2. No livestock or crop sector multiplier has the largest magnitude for any of the three counties. The multipliers will be used in the following sections, in which the economic impacts of changes in livestock production will be analyzed.

In Morrow County, Ranching (Dependent on Public Land) has the fourth largest output multiplier, 2.10. The Morrow County dependent ranching multiplier is well above the county average multiplier of 1.65. Although the Private Land Dependent ranching multiplier ranked seventh, at 2.00 it also is well above the average multiplier. Ranching has the eighth largest output multiplier, 2.00, in Grant County. Other agriculture falls just higher in seventh place at 2.04. Both of these categories are above the Grant County average multiplier of 1.84. In Malheur County, livestock production ranks 13th in multiplier magnitude, while crop production ranks 7th.

## Economic Effects of Forage and Price Variation

### *Analysis Overview*

The relative profitability of beef cattle enterprises is affected by management decisions, the mix of resources the individual operation has at hand, relative prices received for products, and relative costs of inputs used in the business. For this analysis, we have examined the impacts on commercial-sized ranches in three regions of the state: High Desert, Northeastern Mountain, and North Central Plateau. These areas correspond to input-output models developed for Malheur (Obermiller et al. 1993), Grant (Obermiller and Stringham 1993), and Morrow (Obermiller and Glascock 1995) counties.

Spreadsheets were developed that modeled forage availability, cattle herd size, and the enterprise budgets. Initially, forage availability was balanced with the cattle herd size as indicated in the enterprise budget publication. Two different analyses then were conducted.

The first imposed 25, 50, and 75 percent reductions in all available forage, public and private, during the grazing season. Hay use during winter was adjusted to herd size, and the relative proportions of native hay and alfalfa hay were kept constant. Forage reductions were imposed on native rangeland and public permits, and the cattle herd then was balanced with available feed. In one scenario (No Hay Use), excess hay (i.e., hay raised by the ranch and fed to own cattle that no longer

is needed if herd size is reduced) was not used, so in effect it could be sold through the hay enterprise. In the second scenario (Hay Use), unused hayland was converted to irrigated pasture and used to offset some of the rangeland reduction effects on herd size. This scenario was available only in the Mountain and High Desert regions.

The second analysis imposed changes of 10, 20, and 30 percent in average calf prices compared to the baseline operation. Break-even average calf prices were calculated for a variety of financial and economic indicators.

In the analysis, cow/calf enterprise budgets for 300 (breeding) cow operations were used in the Mountain (Turner et al. in press a) and Plateau (Turner et al. in press b) regions and a 350 (breeding) cow operation in the High Desert region (Turner et al. 1996a). These sizes were selected as being the most representative of each region, although variability does exist. For larger operations, the results may be less than those presented here because of greater access to AUMs and alternative forages. Smaller operations may experience more extreme results if their size makes them susceptible to very small changes. Stock count and forage balance charts used to prepare the baseline forage requirements of each operation are presented in Appendix B. The total number of beef cows identified in the 1992 Census of Agriculture in each region then was divided by 300 to find the number of representative units for the Mountain and Plateau regions and by 350 in the High Desert region.



The economic effect on related businesses in each region is evaluated using economic multipliers developed for one county in each region and then extrapolated to each region as a whole. While this method is not precise, it will show the potential economic effects of the forage reduction alternatives.

### **Budget Results**

#### **Forage Reductions**

The baseline enterprise budgets were shown in Tables 3-5 earlier in this publication. Changes in herd size, income, cost, and profitability for each level of forage reduction and hay use scenario are summarized in Table 12. The complete results are in Appendices C-1 through C-5.

Under the baseline scenario, gross returns per head were highest for the Mountain ranch at \$388 per head. The High Desert and Plateau ranches had gross returns of \$358 and \$353 per head, respectively. Cash costs (B+C) per head were also highest, \$337 per head, for the Mountain ranch. However, the 50-cow difference between herds and lower cash fixed costs gave the profit advantage to the Mountain ranch. The Mountain ranch had higher returns to cash costs and ranked highest on all other measures of profitability as well. The Plateau ranch had the least favorable profitability measures and was the only ranch to have a negative projected return to management and land and livestock ownership (Row I). None of the ranches returned a positive projected return when all economic costs are considered (Row J).

Ranches began to lose their ability to cover cash costs under the 50 percent forage reduction scenario. Only the Mountain region ranch, if allowed to convert hayland to pasture, is able to cover cash costs throughout all of the scenarios. Allowing hayland to be used as irrigated pasture to replace lost forage ameliorated the impact on the cattle enterprise. For example, if a High Desert ranch loses 25 percent of its native rangeland and public allotment, breeding-cow herd size must be reduced from 350 head to 278 head. Similarly, gross revenues from cattle will decline by 21 percent. However, if hayland can be converted to pasture, the herd size only declines to 299 head and gross revenues only decline by 15 percent. Cash profitability (Row H in Table 12) is higher under the hay use conversion alternative than by not using the hay, \$5,393 versus \$4,081 (compared to \$13,531 before the reductions).

#### **Variation in Calf Price Scenarios**

In Table 13, we present the effects of varying average calf prices for the three regions. Complete results are in Appendices D-1 through D-3. Numbers shown assume full stocking of the ranch using the baseline scenario. The relationship of calf prices (steers/heifers) was maintained throughout the price ranges considered. The steer/heifer price ratio was 1.09 to 1 for all three regions, although prices generally were higher in the High Desert. The baseline prices were \$77.50 or \$75.50 per cwt and represent 3-year averages, 1993-95. A \$50 average calf price,

Table 12. Economic effects of 25-, 50-, and 75-percent reductions in public and private rangelands on example ranches in three regions of Oregon.

Economic Effects of Different Rangeland Pasture Forage Reductions								
	Baseline			25% Forage Reduction				
	High Desert	Mountain	Plateau	High Desert		Mountain		Plateau*
	(350 Head)	(300 Head)	(300 Head)	No Hay	Hay	No Hay	Hay	No Hay
Cow Herd Size	350	300	300	278	299	223	247	223
A Gross Revenue (\$)	125,393	116,442	105,761	(-20)**	(-15)	(-26)	(-18)	(-26)
B Total Variable Costs (\$)	106,993	97,752	93,295	99,687	107,064	86,628	95,920	79,196
C Cash Fixed Costs (\$)	4,869	3,480	6,293	(-21)	(-15)	(-26)	(-18)	(-25)
D Noncash Fixed Costs (\$)	13,387	13,966	13,747	90,737	96,802	76,331	80,249	77,556
E Opportunity Cost of Land Ownership (\$)	15,312	13,125	13,125	(-15)	(-10)	(-22)	(-18)	(-17)
F Opportunity Cost of Livestock Ownership (\$)	5,768	3,653	4,140	4,869	4,869	3,480	3,480	6,293
G Gross Revenue - TVC (A-B) (\$)	18,400	18,690	12,466	(0)	(0)	(0)	(0)	(0)
H Net Proj Ret over TVC and CFC (A-B-C) (\$)	13,531	15,210	6,173	13,387	13,387	13,966	13,966	13,747
I Net Proj Ret to Mgt and Land/Lvstk (H-D) (\$)	144	1,244	-7,574	(0)	(0)	(0)	(0)	(0)
J Proj Ret Net of All Economic Costs (I-E-F) (\$)	-20,936	-15,534	-24,838	15,312	15,312	13,125	13,125	13,125
K Proj Ret to Mgt, Land & Lvstk, and Fam Labor (I + Family Labor) (\$)	12,144	14,594	12,426	(0)	(0)	(0)	(0)	(0)
				4,581	4,829	2,715	2,715	3,077
				(-21)	(-16)	(-26)	(-26)	(-26)
				8,950	10,262	10,296	15,672	1,640
				(-51)	(-44)	(-45)	(-16)	(-87)
				4,081	5,393	6,816	12,192	-4,653
				(-70)	(-60)	(-55)	(-20)	(-175)
				-9,306	-7,994	-7,150	-1,774	-18,400
				(-6,566)	(-5,655)	(-675)	(-243)	(-143)
				-29,199	-28,135	-22,990	-17,615	-34,602
				(-39)	(-34)	(-48)	(-13)	(-39)
				2,694	4,006	6,200	11,576	1,600
				(-78)	(-67)	(-58)	(-21)	(-87)

\* Plateau Region does not have a Hay Use alternative. It was determined that ranches in this region purchase all of their hay. The option of using the additional hay as feed therefore was not considered.

\*\* Numbers in parentheses are percent change from the Baseline Scenario.

Table 12 (continued). Economic effects of 25-, 50-, and 75-percent reductions in public and private rangelands on example ranches in three regions of Oregon.

Economic Effects of Different Rangeland Pasture Forage Reductions					
	50% Forage Reduction				
	High Desert		Mountain		Plateau*
	No Hay	Hay	No Hay	Hay	No Hay
Cow Herd Size	205	248	147	195	147
	(-41)**	(-29)	(-51)	(-35)	(-51)
A Gross Revenue (\$)	73,624	88,730	57,200	75,786	52,277
	(-41)	(-29)	(-51)	(-35)	(-51)
B Total Variable Costs (\$)	74,239	86,541	57,633	65,196	61,817
	(-31)	(-19)	(-41)	(-33)	(-34)
C Cash Fixed Costs (\$)	4,869	4,869	3,480	3,480	6,293
	(0)	(0)	(0)	(0)	(0)
D Noncash Fixed Costs (\$)	13,387	13,387	13,966	13,966	13,747
	(0)	(0)	(0)	(0)	(0)
E Opportunity Cost of Land Ownership (\$)	15,312	15,312	13,125	13,125	13,125
	(0)	(0)	(0)	(0)	(0)
F Opportunity Cost of Livestock Ownership (\$)	3,378	4,005	1,790	1,790	2,028
	(-41)	(-31)	(-51)	(-51)	(-51)
G Gross Revenue - TVC (A-B) (\$)	-615	2,189	-432	10,590	-9,540
	(-103)	(-88)	(-102)	(-43)	(-177)
H Net Proj Ret over TVC and CFC (A-B-C) (\$)	-5,484	-2,680	-3,912	7,110	-15,833
	(-141)	(-120)	(-126)	(-53)	(-356)
I Net Proj Ret to Mgt and Land & Livestock (H-D) (\$)	-18,871	-16,067	-17,878	-6,856	-29,580
	(-13,213)	(-11,265)	(-1,537)	(-651)	(-291)
J Proj Ret Net of All Economic Costs (I-E-F) (\$)	-37,561	-35,384	-32,793	-21,771	-44,734
	(-79)	(-69)	(-111)	(-40)	(-80)
K Proj Ret to Mgt, Land & Lvstk, and Fam Labor (I + Family Labor) (\$)	-6,871	-4,067	-4,528	6,494	-9,580
	(-157)	(-133)	(-131)	(-56)	(-177)
* Plateau Region does not have a Hay Use alternative. It was determined that ranches in this region purchase all of their hay. The option of using the additional hay as feed therefore was not considered.					
** Numbers in parentheses are percent change from the Baseline Scenario.					

Table 12 (continued). Economic effects of 25-, 50-, and 75-percent reductions in public and private rangelands on example ranches in three regions of Oregon.

Economic Effects of Different Rangeland Pasture Forage Reductions						
		75% Forage Reduction				
		High Desert		Mountain		Plateau
		No Hay	Hay	No Hay	Hay	No Hay
	Cow Herd Size	134	196	71	143	72
		(-62)	(-44)	(-76)	(-52)	(-76)
A	Gross Revenue (\$)	48,275	70,055	27,773	55,652	25,713
		(-62)	(-44)	(-76)	(-52)	(-76)
B	Total Variable Costs (\$)	58,193	76,168	38,749	50,114	46,740
		(-46)	(-29)	(-60)	(-49)	(-50)
C	Cash Fixed Costs (\$)	4,869	4,869	3,480	3,480	6,293
		(0)	(0)	(0)	(0)	(0)
D	Noncash Fixed Costs (\$)	13,387	13,387	13,966	13,966	13,747
		(0)	(0)	(0)	(0)	(0)
E	Opportunity Cost of Land Ownership (\$)	15,312	15,312	13,125	13,125	13,125
		(0)	(0)	(0)	(0)	(0)
F	Opportunity Cost of Livestock Ownership (\$)	2,208	3,165	865	865	993
		(-62)	(-45)	(-76)	(-76)	(-76)
G	Gross Revenue - TVC (A-B) (\$)	-9,918	-6,112	-10,976	5,538	-21,027
		(-154)	(-133)	(-159)	(-70)	(-269)
H	Net Proj Ret over TVC and CFC (A-B-C) (\$)	-14,787	-10,981	-14,456	2,058	-27,320
		(-209)	(-181)	(-195)	(-86)	(-543)
I	Net Proj Ret to Mgt and Land & Livestock (H-D) (\$)	-28,174	-24,368	-28,422	-11,908	-41,067
		(-19,678)	(-17,033)	(-2,384)	(-1,057)	(-442)
J	Proj Ret Net of All Economic Costs (I-E-F) (\$)	-45,694	-42,846	-42,412	-25,898	-55,185
		(-118)	(-105)	(-173)	(-67)	(-122)
K	Proj Ret to Mgt, Land & Lvstk, and Fam Labor (I + Family Labor) (\$)	-16,174	-12,368	-15,072	1,442	-21,067
		(-233)	(-202)	(-203)	(-90)	(-270)
* Plateau Region does not have a Hay Use alternative. It was determined that ranches in this region purchase all of their hay. The option of using the additional hay as feed therefore was not considered.						
** Numbers in parentheses are percent change from the Baseline Scenario.						

Table 13. Summary of price effects using baseline cattle numbers and weights.

	Gross Revenue (\$)	Net of Total Variable Costs (\$)	Net of All Economic Costs (\$)	Returns to Mgmt, Land, Livestock and Family Labor (\$)	Baseline
<b>Baseline</b>					
High Desert	125,393	18,400	-20,936	12,144	
Mountain	116,442	18,690	-15,534	14,594	
Plateau	105,761	12,466	-24,838	12,426	
<b>\$50/cwt average calf price</b>					
High Desert	138,032	31,039	-8,297	24,783	
	(-35)*	(-240)	(-211)	(-363)	
Mountain	128,217	30,466	-3,759	26,370	
	(-34)	(-209)	(-252)	(-268)	
Plateau	69,944	-23,351	-60,655	-23,391	
	(-34)	(-287)	(-144)	(-288)	
<b>\$75/cwt Average Calf Price</b>					
High Desert	150,553	43,560	4,224	37,304	
	(-3)	(-20)	(-18)	(-30)	
Mountain	139,860	42,108	7,884	38,012	
	(-5)	(-3)	(-4)	(-4)	
Plateau	104,916	11,621	(25,683)	11,581	
	(-8)	(-7)	(-3)	(-7)	
<b>\$100/cwt Average Calf Price</b>					
High Desert	163,074	56,081	16,745	49,825	
	(+60)	(+200)	(+176)	(+303)	
Mountain	151,502	53,750	19,526	49,654	
	(+33)	(+203)	(+245)	(+260)	
Plateau	139,888	46,593	9,288	46,553	
	(+32)	(+274)	(+303)	(+275)	
<b>Break-even Average Calf Prices (\$/cwt)</b>					
High Desert		68.92	90.22	69.78	77.50
Mountain		68.59	89.45	69.01	75.50
Plateau		74.50	97.69	69.82	75.50

\*Values in parentheses are percent changes from baseline values.

approximately a 34-35 percent reduction, resulted in the same percentage reduction in gross revenues. Effects on the three measures of economic return presented in Table 13 were all losses of 150 percent or greater. The \$75 average calf price resulted in smaller losses, 3 to 30 percent, in economic returns because this represented only a 2-3 cent per cwt reduction from the baseline prices. At \$100 per cwt average calf price, a 30-33 percent increase in baseline prices, improved all return measurements by at least 200 percent. However, while average Oregon calf prices have approached this level, they never have been recorded at that level (see Figure 24).

As can be seen, ranches did not begin to cover all economic costs until somewhere between \$75/cwt and \$100/cwt—prices that were received by producers between 1985 and 1995.

Break-even average calf prices were within the range of \$68.59 per cwt to \$97.69 per cwt. The typical High Desert 350-cow operation would require average calf prices of \$90.22 to show a true profit, above all opportunity costs. In this study, covering cash costs seems to be possible with prices in the high \$60 per cwt range, but real profits will require a much higher price than seen in the market recently.

### ***Input-Output Analysis***

OSU has developed three Input-Output models for counties in eastern Oregon that are

considered current. These three models can provide insight into the impacts of various scenarios on the county economies. The results from the hay use and calf price variation scenarios were analyzed using these I-O models. The I-O models show the entire economic impact of these changes on the county economies based on changes in the values of beef cattle exported from the county.

The Malheur County I-O model was used to represent the High Desert Region; Grant County to represent the Mountain region; and Morrow County to represent the North Central Plateau Region. Caution must be used in extrapolating the results from one county to an entire region. Generally speaking, the multipliers are larger for entire regions than for individual counties. Therefore, using the county multiplier to evaluate regional impacts should lead to a conservative estimate. In addition, it is unlikely that any one county represents what is occurring in other counties of that region. Counties vary in number of and variation of services or resources available. Agricultural practices and subsectors are not the same across a region. Some parts of a region may produce strictly dryland row crops, while others produce primarily irrigated row crops. Despite these caveats, these models can provide useful information indicating relative magnitudes of change in the economy and across sectors within the economy, as affected by each of the scenarios.

## Forage Reductions

The economic impacts in the three regions from the 25-, 50-, and 75-percent public and private forage reductions are shown in Tables 14, 15, and 16. Based on the 1992 Census of Agriculture beef cow numbers, we estimated that there were 745 (350-cow equivalent) ranches in the High Desert region, 425 (300-cow equivalent) ranches in the Mountain region, and 272 (300-cow equivalent) ranches in the North Central Plateau region. Tables for an individual ranch within each of the underlying counties are shown in Appendices E-1 through E-5.

Table 14 shows the economic impacts on the High Desert region if all ranches were 350-cow units and all had to reduce forage use by the same amount. What these tables show is the impact that a change in ranching will have on the multi-county economy. For example, the 25-percent forage reduction with hay use substitution results in direct losses of \$12.3 million per year. The total sales (output) loss for the region after all sectors have adjusted their purchases is about \$25 million. This total impact includes the initial decrease in ranch export sales plus the indirect and induced effect on other business activity in the region due to the interaction of the Livestock Production, Procurement, and Feeding sector with other sectors of the economy. The indirect and induced loss to the other sectors amounts to \$12.7 million.

The household line is used as a proxy for personal income impacts from the change in forage availability. The final impact for the

High Desert region from the 25-percent forage reduction with hay substitution is about \$4.5 million. In contrast, Oregon's total for personal income is estimated at \$59 billion. In even the worst-case scenario, the impact on personal income from the management change does not significantly affect statewide income levels (0.01 percent).

Value added is defined as the additional value added to agricultural commodities by first handlers in processing and handling. Miles and Cornelius (1994) estimated gross value added through processing, handling, and transportation by businesses that initially receive raw materials from ranchers. Their estimate of gross value added includes only purchased items such as packaging materials, fuel, utilities, wages, salaries, and profit. For this study, the ratios found by Miles and Cornelius for meat animals were used to derive the value-added figures in the tables. The procedure used was to calculate the percent of income received from the packaging or other category from Miles and Cornelius, multiply that value by the implied direct and indirect sales impact, and add the two values together. This is only 0.04 percent of all agricultural value added reported by Miles and Cornelius.

The final column on jobs is a proxy indicator for the level of jobs that may be affected from the management change. To do this estimation more precisely would require additional model development that was outside the scope of this project. The values shown should give a rough indication of impacts on jobs. Job impact was calculated by taking the

Table 14. Economic impact on the High Desert region from forage reductions in the livestock production, procurement, and feeding sector.

Forage Reduction	Impacts on the High Desert Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
No Hay Substitution					
25%	(17,236)	(35,016)	(6,255)	(2,309)	(353)
50%	(34,711)	(70,519)	(12,597)	(4,650)	(710)
75%	(51,707)	(105,048)	(18,765)	(6,927)	(1,058)
Hay Substitution					
25%	(12,289)	(24,967)	(4,460)	(1,646)	(251)
50%	(24,583)	(49,942)	(8,921)	(3,293)	(503)
75%	(37,104)	(75,380)	(13,465)	(4,971)	(759)
Agriculture Total				3,994,269	60,991
State Total			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendices C-1 and 2. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendices C-1 and 2. <sup>c</sup> Households' direct and indirect impact from Appendices C-1 and 2. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8.					



Table 15. Economic impact on the Mountain region from forage reductions in the ranching sector.

Forage Reduction	Impacts on the Mountain Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
No Hay Substitution					
25%	(11,404)	(22,859)	(4,582)	(1,507)	(258)
50%	(22,660)	(45,422)	(9,105)	(2,995)	(513)
75%	(33,916)	(67,984)	(13,627)	(4,483)	(768)
Hay Substitution					
25%	(7,849)	(15,734)	(3,154)	(1,038)	(178)
50%	(15,551)	(31,172)	(6,248)	(2,055)	(352)
75%	(23,252)	(46,609)	(9,343)	(3,073)	(527)
Agriculture Total				3,994,269	60,991
State Total			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendices C-3 and 4. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendices C-3 and 4. <sup>c</sup> Households' direct and indirect impact from Appendices C-3 and 4. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8.					

Table 16. Economic impact on the North Central Plateau region from forage reductions in the ranching sector.

Forage Reduction	Impacts on the North Central Plateau Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
No Hay Substitution					
25%	(6,503)	(13,627)	(1,818)	(899)	(102)
50%	(13,093)	(27,435)	(3,661)	(1,809)	(206)
75%	(19,596)	(41,061)	(5,479)	(2,708)	(309)
Agriculture Total				3,994,269	60,991
State Total			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendix C-5. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendix C-5. <sup>c</sup> Households' direct and indirect impact from Appendix C-5. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8.					

personal income amount shown and dividing it by the average agricultural income (\$17,740). The job loss of 251 jobs should be interpreted as a rough estimate of the full-time equivalent positions lost within the region as a result of the forage loss. This is a small percentage of total agricultural jobs (0.4 percent) and total jobs (0.02 percent) in Oregon.

Of special importance are the direct and induced impacts on household incomes in the region. The household income effect approximates the personal income impact of changes in exports or other sales to final demand. With the 25-percent forage reduction, local households will immediately lose \$2.3 million through loss of employment and other sources of household income with firms in this sector. Eventually, household incomes in the region will decline by \$4.5 million. In other words, the personal incomes of many regional households will decrease (by about \$2.2 million), including those who are not directly associated with the ranching sector. All of the households receiving the initial \$2.3 million decrease are associated with the livestock industry. Due to linkages and feedbacks, these same households suffer another loss of \$288,000 (\$2.3 million  $\times$  1.1237 – \$2.3 million). The remaining \$1.8 million is distributed as personal income losses to households associated with other sectors of the economy.

The results estimated for the Mountain and North Central Plateau regions, Tables 15 and 16, were similar but at lower levels. The results for all sectors are shown in Appendices C-1 through C-5.

Each of the other scenarios for different percent forage reductions and the different regions can be interpreted in a similar manner. The bottom-line effect is that for a 25-percent reduction in forage availability throughout eastern Oregon, where about three-quarters of Oregon's beef cattle are raised, the economy would decline by about \$54 million dollars, or \$64 per AUM lost (ranging from \$59 to \$75). While this number likely would change with the development of a regional I-O model due to sales made between regions, it does represent a conservative estimate of the overall impact.

### Price Effects

Tables 17, 18, and 19 show some selected economic impacts from price changes relative to the 3-year average prices used in the OSU enterprise budgets. The complete I-O results are in Appendix F-1 through F-3. Each cattle price was raised or lowered by 10, 20, or 30 percent. The results in the tables show what the economic impacts would be for price increases. The results would be of the same magnitude, but negative, for price decreases. The interpretation of the tables is identical to that for the forage reduction tables discussed in the previous section. All changes for price impacts are based on the full stocking herd sizes of 350 cows for the High Desert and 300 cows in the other two regions.

In the High Desert region, each 10 percent change in prices results in about \$17 million of sales activity. Personal income would change by about \$3 million, value added

Table 17. Economic impact on the High Desert region from livestock price changes in the livestock production, procurement, and feeding sector.

Cattle Price Change	Impacts on the High Desert Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
10% <sup>f</sup>	8,387	17,040	3,044	1,124	172
20%	16,775	34,080	6,088	2,247	343
30%	25,162	51,120	9,131	3,371	515
Agriculture Total				3,994,269	60,991
State Total			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendix D-1. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendix D-1. <sup>c</sup> Households' direct and indirect impact from Appendix D-1. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8. <sup>f</sup> Price change impacts are positive for price increases, negative for decreases.					

Table 18. Economic impact on the Mountain region from livestock price changes in the ranching sector.

Cattle Price Change	Impacts on the Mountain Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
10% <sup>f</sup>	4,506	9,031	1,810	596	102
20%	8,954	17,975	3,598	1,183	203
30%	13,402	26,864	5,385	1,771	304
<b>Agriculture Total</b>				3,994,269	60,991
<b>State Total</b>			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendix D-2. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendix D-2. <sup>c</sup> Households' direct and indirect impact from Appendix D-2. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8. <sup>f</sup> Price change impacts are positive for price increases, negative for decreases.					

Table 19. Economic impact on the North Central Plateau region from livestock price changes in the ranching sector.

Cattle Price Change	Impacts on the North Central Plateau Region				
	Direct Impact <sup>a</sup>	Sales <sup>b</sup>	Personal Income <sup>c</sup>	Value Added <sup>d</sup>	Jobs <sup>e</sup>
	\$1,000	\$1,000	\$1,000	\$1,000	
10% <sup>f</sup>	2,622	5,494	733	362	41
20%	5,207	10,912	1,456	720	82
30%	7,793	16,329	2,179	1,077	123
Agriculture Total				3,994,269	60,991
State Total			59,235,180		1,384,371
<sup>a</sup> First-round spending impact, Total Purchases from Appendix D-3. <sup>b</sup> Direct and indirect impact, Multiplier effect from Appendix D-3. <sup>c</sup> Households' direct and indirect impact from Appendix D-3. <sup>d</sup> Calculated based on Miles and Cornelius (1994) as implied direct and indirect nonlabor value added. <sup>e</sup> Calculated as personal income divided by average agricultural income from Table 8. <sup>f</sup> Price change impacts are positive for price increases, negative for decreases.					

by \$1 million, and jobs by 172. As with the forage impacts, these values are a small percentage of the totals for both agriculture and the state.

The total impact throughout eastern Oregon would be in the neighborhood of \$31 million for each 10 percent change in prices. Therefore, we can estimate that if average calf prices dropped from \$100/cwt to \$60/cwt

(a 40-percent decrease as recently occurred), then business activity in eastern Oregon would drop by about \$124 million. Of this, personal income would decline by about \$12 million. Again, while this number likely would change with the development of a regional I-O model due to sales made between regions, it does represent a conservative estimate of the overall impact.

## Conclusions

The beef cattle industry is a major part of one of the largest agricultural commodity sectors in Oregon, accounting for roughly 10 percent of gross receipts. This sector has important implications for the Oregon economy. The roughly \$350-400 million generated by the sales of cattle and calves produces about twice that amount in gross economic activity. This impact is relatively more important in eastern Oregon's economy compared to western Oregon.

What is apparent is that not only the beef industry would be hurt by restrictions on grazing, but many related industries also would be affected. For example, if rangeland grazing is reduced by 25 percent and the ranch has to adjust herd size to be balanced with available forage supplies, each 350-cow ranch in Malheur County would reduce spending in the local economy by \$16,496. This will be shared in lost purchases from households (\$3,126); livestock production, procurement, and feeding (\$1,811); crop producers (\$1,418); agricultural services (\$443); food crop procurement and food processing (\$167); construction, mining, and manufacturing (\$165); and so on as shown in Appendix F-1. The livestock production, procurement, and feeding sector loses the original \$16,496 plus an additional \$2,540 through respending. Similarly, households in Malheur County would end up losing \$5,986 from the loss in income from the forage reduction. This same analysis can be applied to the other counties as well, although the relative impacts on various sectors differs.

On a regional basis, Table 20 shows the impact on various combined sectors based on Tables 14 to 16 for a 25-percent reduction in public and private rangeland forage. Looking in the Percent of Sector Total columns, it can be seen that about half of the impact occurs in the High Desert region, with the Mountain and Plateau regions splitting the other half (the TOTAL values at the bottom). There are differences among regions as to which sectors of the economy are affected. Whether the impact on a given sector is relatively high or low can be determined by comparing the percent value in the table with the TOTAL percent at the bottom. For example, Other Agriculture is affected relatively less in the Mountain Region (15 percent vs 29 percent) compared to the other two regions (46 percent vs 46 percent in the High Desert, and 39 percent vs 25 percent in the Plateau region). On the other hand, the impact on the Construction, Mining, etc. sector is relatively greater in the Mountain region.

The Percent of Total in Region columns show the relative impact within each region and for all three regions together. These values show the same patterns as before. In this case, we can compare sectors with the Total column and get an idea of the patterns in the different regions. For example, the forage loss in the Plateau region will have a much higher impact on the Other Agriculture sector than occurs in the other two regions. The reason for this is the higher reliance on purchased feeds in this region.



Table 20. Economic impact of a 25-percent reduction in public and private forage in three regions of Oregon.

	Impact from 25-percent Forage Reduction (\$)				Percent of Sector Total			Percent of Total in Region			
	High Desert	Mountain	Plateau	TOTAL	High Desert	Mountain	Plateau	High Desert	Mountain	Plateau	Total
Livestock	13,809,572	7,878,523	7,365,533	29,053,628	48%	27%	25%	55.3%	50.1%	54.1%	53.5%
Other Ag	1,501,761	474,893	1,281,782	3,258,436	46%	15%	39%	6.0%	3.0%	9.4%	6.0%
Ag Services	647,650	355,581	887,688	1,890,919	34%	19%	47%	2.6%	2.3%	6.5%	3.5%
Const, Mining, Manu, Fin, Ins, Real Estate, Auto, Gas, Trans	1,823,742	1,940,391	1,369,575	5,133,708	36%	38%	27%	7.3%	12.3%	10.1%	9.4%
Med and Prof Svcs	423,983	218,216	8,454	650,653	65%	34%	1%	1.7%	1.4%	0.1%	1.2%
Lodging, Dining, Groc	698,036	489,023	24,712	1,211,771	58%	40%	2%	2.8%	3.1%	0.2%	2.2%
Other Trade	691,892	500,797	533,913	1,726,602	40%	29%	31%	2.8%	3.2%	3.9%	3.2%
Other Services	169,593	85,559	111,855	367,007	46%	23%	30%	0.7%	0.5%	0.8%	0.7%
City and County Gov	610,782	592,636	208,103	1,411,521	43%	42%	15%	2.4%	3.8%	1.5%	2.6%
State and Federal Gov	131,496	42,387	16,908	190,791	69%	22%	9%	0.5%	0.3%	0.1%	0.4%
Households	4,459,815	3,153,921	1,818,297	9,432,033	47%	33%	19%	17.9%	20.0%	13.3%	17.4%
<b>TOTAL</b>	<b>24,968,322</b>	<b>15,731,927</b>	<b>13,626,820</b>	<b>54,327,069</b>	<b>46%</b>	<b>29%</b>	<b>25%</b>				<b>100.0%</b>

In a similar fashion, evaluating changes in beef cattle prices shows the impacts prices have on local economies. Using the three county input-output models as representative of the three eastern Oregon regions, we can estimate that each 10 percent change in prices from the past 3-year average prices will result in an economic impact of about \$31.5 million dollars. In other words, if prices go down by 10 percent, economic activity in eastern Oregon will decline by \$31.5 million in all sectors. More than half of this impact will be felt in the High Desert counties. While the livestock sector loses \$16.6 million, households lose \$5.6 million (Table 21). The remaining sectors make up the remaining 29 percent of the losses in local economic activity.

Comparing Tables 20 and 21 also shows some differences among the regions when the economic impact is due to prices versus when it is due to forage availability. Based solely on prices, the High Desert region incurs 54 percent of the loss from a price decrease, whereas it incurs only 46 percent of the total loss from a forage reduction. The Plateau region's response is just the opposite, being higher for the forage reduction. The Plateau region does not have the flexibility in forage that was used in the other two regions. The Plateau region does not have native haylands that can be converted to pasture; thus, the effect of the rangeland forage reduction was more severe in terms of herd size reductions.

Although the analysis did not estimate employment impacts directly, it can be inferred that employment will be affected. If the average worker in the region makes \$20,000/year in household income, a change of 10 percent in cattle prices is equivalent to 279 full-time jobs. Similarly, if 25 percent of the public and private forage base is lost, an equivalent of 472 full-time jobs would be lost. In order for these employment impacts to be realized, however, the change most likely would need to be based on long-term changes. In other words, a 10-percent dip in cattle prices will not likely lead to an immediate reduction in 279 jobs, but a permanent reduction in federal forage could lead to the long-term loss of jobs indicated.

While fluctuations in income from the cattle industry are expected, the long-term trend appears to be upward. The cattle price cycle has been observed to occur fairly regularly on a 7- to 10-year basis. Fluctuations in gross sales from cattle are expected and should be planned for over the long term with prudent financial management.

The longer-term impact of forage reductions will be more significant. If less forage is available to support livestock, the impact on local rural economies will be "permanent." The \$26.6 million in direct sales loss expected from a 25-percent forage reduction is about 7-10 percent of gross receipts from cattle and calves in the three regions under consideration.

Table 21. Economic impact of a 10-percent average calf price change in three regions of Oregon.

	Impact from 10-percent Price Change (\$)				Percent of Sector Total			Percent of Total in Region			
	High Desert	Mountain	Plateau	TOTAL	High Desert	Mountain	Plateau	High Desert	Mountain	Plateau	Total
Livestock	9,424,996	4,522,208	2,969,765	16,916,969	56%	27%	18%	55.3%	50.2%	54.1%	53.6%
Other Ag	1,024,948	254,562	516,812	1,796,322	57%	14%	29%	6.0%	2.8%	9.4%	5.7%
Ag Services	442,019	204,101	357,914	1,004,034	44%	20%	36%	2.6%	2.3%	6.5%	3.2%
Const, Mining, Manu, Fin, Ins, Real Estate, Auto, Gas, Trans	1,244,701	1,113,769	552,210	2,910,680	43%	38%	19%	7.3%	12.4%	10.1%	9.2%
Med and Prof Svcs	289,367	125,254	3,409	418,030	69%	30%	1%	1.7%	1.4%	0.1%	1.3%
Lodging, Dining, Groc	476,408	280,695	9,964	767,067	62%	37%	1%	2.8%	3.1%	0.2%	2.4%
Other Trade	472,215	287,453	215,273	974,941	48%	29%	22%	2.8%	3.2%	3.9%	3.1%
Other Services	115,747	49,110	45,100	209,957	55%	23%	21%	0.7%	0.5%	0.8%	0.7%
City and County Gov	416,857	340,168	83,906	840,931	50%	40%	10%	2.4%	3.8%	1.5%	2.7%
State and Federal Gov	89,745	24,330	6,817	120,892	74%	20%	6%	0.5%	0.3%	0.1%	0.4%
Households	3,043,811	1,810,325	733,133	5,587,269	54%	32%	13%	17.9%	20.1%	13.3%	17.7%
<b>TOTAL</b>	<b>17,040,814</b>	<b>9,011,975</b>	<b>5,494,303</b>	<b>31,547,092</b>	<b>54%</b>	<b>29%</b>	<b>17%</b>				<b>100.0%</b>

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Appendix A-1. Gross output multipliers for sectors of the Malheur County, Oregon economy, 1991 (Obermiller et al. 1993).

Sector	Multiplier
Livestock Production, Procurement, and Feeding	2.03
Crop Production	2.31
Food Procurement and Food Processing	2.09
Agricultural Services	1.77
Communications and Utilities	1.51
Financial Services	2.63
Insurance and Real Estate	2.11
Medical and Related Services	2.24
Other Professional Services	2.31
Automotive and Gasoline Sales and Supplies	1.77
Transportation	1.70
Construction, Mining, and Manufacturing	2.06
Wholesale and Retail Hardware Trade	1.36
Wholesale and Retail Equipment Dealers	1.40
Wholesale and Retail Groceries and Supermarkets	1.30
Lodging and Dining Establishments	2.54
Other Wholesale and Retail Trade	1.34
Other Wholesale and Retail Services	2.58
City and County Government	2.43
Local Agencies of State and Federal Government	2.40
Bureau of Land Management	2.11
Households	1.99
<b>Weighted Malheur County Average</b>	<b>2.00</b>

Appendix A-2. Gross output multipliers for sectors of the Grant County, Oregon economy, 1991 (Obermiller and Stringham 1993).

Sector	Multiplier
Ranching	2.00
Other Agriculture	2.04
Timber Harvesting and Scheduling	2.24
Lumber and Wood Products Processing	1.79
Agricultural Services	1.53
Construction and Related Services	2.20
Communications and Utilities	1.48
Finance, Insurance, and Real Estate	1.42
Medical Services	2.18
Other Professional Services	2.52
Automotive Sales and Supplies	1.53
Gasoline Services and Distribution	1.26
Lodging	2.04
Cafes and Taverns	2.00
Groceries	1.32
Hardware and Equipment Dealers	1.51
Other Wholesale and Retail Trade	1.44
Other Wholesale and Retail Services	2.27
City and County Government	2.52
Local Agencies of State and Federal Government	2.24
U.S. Forest Service	1.71
Households	1.73
Woodlots	1.00
<i>Weighted Grant County Average</i>	<i>1.84</i>



Appendix A-3. Gross output multipliers for sectors of the Morrow County, Oregon economy, 1993 (Obermiller and Glascock 1995).

Sector	Multiplier
(Public Land) Dependent Ranching	2.10
(Private Land) Other Ranching	1.99
Irrigated Farming	1.29
Dryland Farming	1.78
Food Processing	1.69
Timber Industry	1.96
Agricultural Services	1.79
Construction and Related Services	1.28
Manufacturing, Transportation, and Utilities	1.58
Finance, Insurance, and Real Estate	2.14
Professional Services	2.08
Automotive Sales and Services	1.30
Lodging, Cafes, and Taverns	1.50
Other Wholesale and Retail Trade	1.97
Other Wholesale and Retail Services	2.14
City and County Government	2.09
Local Agencies of State and Federal Government	2.30
Federal Land Management Agencies	1.76
Households	1.57
<i>Weighted Morrow County Average</i>	<i>1.65</i>

Appendix B-1. Stock count and forage balance chart for 350-cow High Desert region ranch (Malheur County).

Stock Count								
Month	350 Cows	Replacement Heifers	Yearling Heifers	Heifer Calves	Steer Calves	Bulls	Horses	TOTAL AUMs
January	350		111			17	5	444
February	343		111	0	0	17	5	437
March	343		111	0	0	17	5	454
April	343		111	0	0	17	5	454
May	343		111	0	0	17	5	454
June	343		111	0	0	17	5	454
July	343		111	0	0	17	5	454
August	343		111	0	0	17	5	454
September	343		111	0	0	17	5	454
October	343		111	33	144	17	5	550
November	350		111			17	5	444
December	350		111			17	5	444
Forage Balance (AUMs)								
Month	Native Hay	Alfalfa Hay	Irrigated Pasture	Private Range	Public Range	AUMs Available	AUMs Required	Balance
January	372	72.5				444.5	444	0.0
February	365	72.5				437.5	437	0.0
March	382	72.5				454.5	454	0.4
April			90	365		455	454	0.9
May			90	365		455	454	0.9
June			90		365	455	454	0.9
July			90		365	455	454	0.9
August			90		365	455	454	0.9
September			90		365	455	454	0.9
October			90	460		550	550	0.4
November			90	355		445	444	0.5
December	372	72.5				444.5	444	0.0
High Desert 350 Cow-Calf Enterprise Budget Used as Basis								
Horses		5						
Cows		350						
Bull:Cow Ratio		0.05						
Calf Crop		0.855						
Replacement Rate		0.13						
Cow Death Rate		0.02						
Rept Death Rate		0.01						
Calf Death Rate		0.04						
Bull Death Rate		0.01						
Bull Cull Rate		0.15						

Stock Count								
Month	300 Cows	Replacement Heifers	Yearling Heifers	Heifer Calves	Steer Calves	Bulls	Horses	TOTAL AUMs
January	300		60			15	5	361
February	297		60	0	0	15	5	358
March	297		60	0	0	15	5	367
April	297		60	0	0	15	5	367
May	297		60	0	0	15	5	367
June	297		60	0	0	15	5	367
July	297		60	0	0	15	5	367
August	297		60	0	0	15	5	367
September	297		60	0	0	15	5	367
October	297		60	73	133	15	5	476
November	300		60			15	5	361
December	300		60			15	5	361
Forage Balance (AUMs)								
Month	Native Hay	Alfalfa Hay	Irrigated Pasture	Private Range	Public Range	AUMs Available	AUMs Required	Balance
January	294	67				361	361	0
February	291	67				358	358	0
March	300	67				367	367	0
April	144	33		190		367	367	0
May				367		367	367	0
June					367	367	367	0
July					367	367	367	0
August					367	367	367	0
September				183	184	367	367	0
October				476		476	476	0
November				361		361	361	0
December	294	67				361	361	0
Mountain 300 Cow-Calf Enterprise Budget Used as Basis								
Horses		5						
Cows		300						
Bull:Cow Ratio		0.05						
Calf Crop		0.931						
Replacement Rate		0.15						
Cow Death Rate		0.01						
Rept Death Rate		0.005						
Calf Death Rate		0.05						
Bull Death Rate		0.01						
Bull Cull Rate		0.2						

Appendix B-3. Stock count and forage balance for 300-cow North Central Plateau region ranch (Morrow County).

Stock Count								
Month	300 Cows	Replacement Heifers	Yearling Heifers	Heifer Calves	Steer Calves	Bulls	Horses	TOTAL AUMs
January	300		65			15	4	363
February	294		65	0	0	15	4	357
March	294		65	0	0	15	4	367
April	294		65	0	0	15	4	367
May	294		65	0	0	15	4	367
June	294		65	0	0	15	4	367
July	294		65	0	0	15	4	367
August	294		65	0	0	15	4	367
September	294		65	0	0	15	4	367
October	294		65	62	127	15	4	468
November	300		65			15	4	363
December	300		65			15	4	363
Forage Balance (AUMs)								
Month	Native Hay	Alfalfa Hay	Irrigated Pasture	Private Range	Public Range	AUMs Available	AUMs Required	Balance
January		363				363	294	69
February		357				357	291	66
March		183		184		367	300	67
April				367		367	144	223
May				367		367	0	367
June				183	184	367	0	367
July					367	367	0	367
August					367	367	0	367
September				184	183	367	0	367
October				468		468	0	468
November				363		363	0	363
December		182		181		363	294	69
North Central Plateau 300 Cow-Calf Enterprise Budget Used as Basis								
Horses		4						
Cows		300						
Bull:Cow Ratio		0.05						
Calf Crop		0.874						
Replacement Rate		0.15						
Cow Death Rate		0.02						
Rept Death Rate		0.01						
Calf Death Rate		0.03						
Bull Death Rate		0.005						
Bull Cull Rate		0.2						

Appendix C-1. Economic impact on the High Desert region from forage reductions in the livestock production, procurement, and feeding sector, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Gross Income Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Livestock Production, Procurement, and Feeding	0.109787	-1,892,261	-3,810,804	-5,676,784	1.1237	-19,367,813	-39,004,623	-58,103,438
Crop Production	0.085945	-1,481,327	-2,983,227	-4,443,980	0.1085	-1,870,079	-3,766,131	-5,610,237
Food Crop Procurement and Food Processing	0.010094	-173,978	-350,372	-521,933	0.0137	-236,130	-475,539	-708,389
Agricultural Services	0.026867	-463,073	-932,577	-1,389,219	0.0527	-908,324	-1,829,264	-2,724,972
Communications and Utilities	0.006656	-114,721	-231,036	-344,163	0.0317	-546,373	-1,100,335	-1,639,120
Financial Services	0.009047	-155,932	-314,029	-467,795	0.0175	-301,626	-607,441	-904,877
Insurance and Real Estate	0.004962	-85,524	-172,235	-256,571	0.0122	-210,276	-423,473	-630,828
Medical and Related Services	0.000333	-5,740	-11,559	-17,219	0.0251	-432,617	-871,243	-1,297,852
Other Professional Services	0.004334	-74,700	-150,437	-224,099	0.0094	-162,016	-326,282	-486,048
Automotive and Gasoline Sales and Supplies	0.004667	-80,439	-161,996	-241,318	0.0332	-572,227	-1,152,401	-1,716,681
Transportation	0.009382	-161,706	-325,658	-485,117	0.0126	-217,170	-437,357	-651,511
Construction, Mining, and Manufacturing	0.009981	-172,030	-346,449	-516,090	0.0412	-710,113	-1,430,089	-2,130,339
Wholesale and Retail Hardware Trade	0.005836	-100,588	-202,573	-301,764	0.0124	-213,723	-430,415	-641,170
Wholesale and Retail Equipment Dealers	0.008409	-144,935	-291,884	-434,806	0.0135	-232,683	-468,597	-698,048
Wholesale and Retail Groceries and Supermarkets	0.002267	-39,073	-78,690	-117,220	0.0505	-870,405	-1,752,900	-2,611,216
Lodging and Dining Establishments	0.000192	-3,309	-6,664	-9,928	0.0063	-108,585	-218,679	-325,756
Other Wholesale and Retail Trade	0.002291	-39,487	-79,523	-118,461	0.0304	-523,967	-1,055,211	-1,571,900
Other Wholesale and Retail Services	0.000783	-13,496	-27,179	-40,487	0.0138	-237,853	-479,010	-713,560
City and County Government	0.008645	-149,003	-300,076	-447,009	0.0497	-856,617	-1,725,131	-2,569,850
Agencies of State and Federal Government	0.000152	-2,620	-5,276	-7,860	0.0026	-44,813	-90,248	-134,439
Bureau of Land Management	0.007157	-123,356	-248,426	-370,069	0.0081	-139,610	-281,158	-418,829
Households	0.189505	-3,266,261	-6,577,886	-9,798,783	0.3629	-6,254,854	-12,596,581	-18,764,561
Multiplier						0	0	0
\$/AUM Lost					2.0316	-35,016,150	-70,518,636	-105,048,451
						63	63	63
Subtotal—All Local Sectors	0.507299	-8,743,679	-17,608,798	-26,231,037				
Nonlocal Households	0.009024	-155,535	-313,231	-466,606				
Nonlocal Government	0.038741	-667,730	-1,344,734	-2,003,191				
Nonlocal Business	0.405589	-6,990,631	-14,078,354	-20,971,892				
Subtotal—All Nonlocal Sectors	0.453354	-7,813,896	-15,736,319	-23,441,689				
Inventory Depletion	0.026578	-458,092	-922,546	-1,374,275				
Depreciation	0.012769	-220,083	-443,223	-660,250				
TOTAL PURCHASES	1.000000	-17,235,750	-34,710,886	-51,707,251				

Appendix C-2. Economic impact on the High Desert region from forage reductions in the livestock production, procurement, and feeding sector allowing hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Livestock Production, Procurement, and Feeding	0.109787	-1,349,214	-2,698,849	-4,073,501	1.1237	-13,809,572	-27,623,463	-41,693,394
Crop Production	0.085945	-1,056,210	-2,112,751	-3,188,875	0.1085	-1,333,397	-2,667,212	-4,025,748
Food Crop Procurement and Food Processing	0.010094	-124,049	-248,137	-374,524	0.0137	-168,364	-336,782	-508,320
Agricultural Services	0.026867	-330,179	-660,461	-996,864	0.0527	-647,650	-1,295,503	-1,955,363
Communications and Utilities	0.006656	-81,798	-163,622	-246,962	0.0317	-389,573	-779,268	-1,176,186
Financial Services	0.009047	-111,182	-222,399	-335,677	0.0175	-215,064	-430,195	-649,314
Insurance and Real Estate	0.004962	-60,980	-121,979	-184,108	0.0122	-149,930	-299,908	-452,665
Medical and Related Services	0.000333	-4,092	-8,186	-12,356	0.0251	-308,463	-617,023	-931,302
Other Professional Services	0.004334	-53,262	-106,541	-160,807	0.0094	-115,520	-231,076	-348,774
Automotive and Gasoline Sales and Supplies	0.004667	-57,355	-114,727	-173,163	0.0332	-408,007	-816,142	-1,231,842
Transportation	0.009382	-115,299	-230,634	-348,107	0.0126	-154,846	-309,741	-467,506
Construction, Mining, and Manufacturing	0.009981	-122,660	-245,359	-370,332	0.0412	-506,322	-1,012,803	-1,528,671
Wholesale and Retail Hardware Trade	0.005836	-71,721	-143,464	-216,537	0.0124	-152,388	-304,824	-460,086
Wholesale and Retail Equipment Dealers	0.008409	-103,341	-206,715	-312,005	0.0135	-165,907	-331,865	-500,900
Wholesale and Retail Groceries and Supermarkets	0.002267	-27,860	-55,729	-84,114	0.0505	-620,613	-1,241,421	-1,873,735
Lodging and Dining Establishments	0.000192	-2,360	-4,720	-7,124	0.0063	-77,423	-154,870	-233,753
Other Wholesale and Retail Trade	0.002291	-28,155	-56,319	-85,005	0.0304	-373,597	-747,311	-1,127,952
Other Wholesale and Retail Services	0.000783	-9,623	-19,248	-29,052	0.0138	-169,593	-339,240	-512,031
City and County Government	0.008645	-106,242	-212,517	-320,761	0.0497	-610,782	-1,221,755	-1,844,052
Agencies of State and Federal Government	0.000152	-1,868	-3,737	-5,640	0.0026	-31,952	-63,915	-96,470
Bureau of Land Management	0.007157	-87,955	-175,938	-265,551	0.0081	-99,544	-199,119	-300,540
Households	0.189505	-2,328,898	-4,658,525	-7,031,331	0.3629	-4,459,815	-8,921,024	-13,464,922
Multiplier						0	0	0
\$/AUM Lost					2.0316	-24,967,096	-49,942,002	-75,379,815
						62	62	63
Subtotal—All Local Sectors	0.507299	-6,234,388	-12,470,726	-18,822,655				
Nonlocal Households	0.009024	-110,899	-221,833	-334,824				
Nonlocal Government	0.038741	-476,103	-952,354	-1,437,433				
Nonlocal Business	0.405589	-4,984,436	-9,970,430	-15,048,840				
Subtotal—All Nonlocal Sectors	0.453354	-5,571,438	-11,144,618	-16,821,097				
Inventory Depletion	0.026578	-326,627	-653,356	-986,141				
Depreciation	0.012769	-156,923	-313,895	-473,777				
TOTAL PURCHASES	1.000000	-12,289,376	-24,582,596	-37,103,670				

Appendix C-3. Economic impact on the Mountain region from forage reductions in the ranching sector, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Gross Income Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Ranching	0.003022	-34,463	-68,478	-102,493	1.0037	-11,446,156	-22,743,661	-34,041,167
Other Agriculture	0.048164	-549,260	-1,091,388	-1,633,515	0.0492	-561,075	-1,114,863	-1,668,651
Timber Harvesting and Hauling	0.001912	-21,804	-43,326	-64,847	0.0073	-83,249	-165,417	-247,584
Lumber and Wood Products Processing	0.001561	-17,802	-35,372	-52,942	0.0040	-45,616	-90,639	-135,663
Agricultural Services	0.043254	-493,267	-980,128	-1,466,989	0.0453	-516,599	-1,026,490	-1,536,380
Construction and Related Services	0.046489	-530,159	-1,053,432	-1,576,706	0.0551	-628,358	-1,248,556	-1,868,754
Communications and Utilities	0.005590	-63,748	-126,668	-189,589	0.0122	-139,128	-276,450	-413,771
Finance, Insurance, and Real Estate	0.036085	-411,512	-817,680	-1,223,847	0.0595	-678,536	-1,348,259	-2,017,983
Medical Services	0.000572	-6,523	-12,961	-19,400	0.0212	-241,764	-480,388	-719,012
Other Professional Services	0.002667	-30,414	-60,434	-90,453	0.0066	-75,266	-149,555	-223,843
Automotive Sales and Supplies	0.041408	-472,215	-938,298	-1,404,380	0.0592	-675,115	-1,341,461	-2,007,808
Gasoline Services and Distribution	0.040250	-459,009	-912,058	-1,365,106	0.0612	-697,922	-1,386,781	-2,075,640
Lodging	0.000052	-593	-1,178	-1,764	0.0005	-5,702	-11,330	-16,958
Cafes and Taverns	0.000078	-890	-1,767	-2,645	0.0064	-72,985	-145,023	-217,060
Groceries	0.004741	-54,066	-107,430	-160,794	0.0554	-631,779	-1,255,354	-1,878,929
Hardware and Equipment Dealers	0.011801	-134,578	-267,409	-400,239	0.0251	-286,239	-568,761	-851,284
Other Wholesale and Retail Trade	0.004216	-48,079	-95,534	-142,989	0.0387	-441,333	-876,935	-1,312,537
Other Wholesale and Retail Services	0.000910	-10,378	-20,620	-30,863	0.0109	-124,303	-246,992	-369,681
City and County Government	0.040346	-460,104	-914,233	-1,368,362	0.0755	-860,999	-1,710,816	-2,560,634
Agencies of State and Federal Government	0.000783	-8,929	-17,743	-26,556	0.0044	-50,177	-99,703	-149,229
U.S. Forest Service	0.000000	0	0	0	0.0010	-11,404	-22,660	-33,916
Households	0.235592	-2,686,682	-5,338,472	-7,990,263	0.4018	-4,582,112	-9,104,716	-13,627,320
Woodlots	0.000000	0	0	0	0.0001	-1,140	-2,266	-3,392
Multiplier					2.0045	-22,859,241	-45,421,609	-67,983,978
\$/AUM Lost						75	75	75
Subtotal—All Local Sectors	0.569493	-6,494,476	-12,904,609	-19,314,742				
Nonlocal Households	0.023859	-272,087	-540,641	-809,194				
Nonlocal Government	0.050546	-576,425	-1,145,363	-1,714,302				
Nonlocal Business	0.315597	-3,599,056	-7,151,371	-10,703,686				
Subtotal—All Nonlocal Sectors	0.390002	-4,447,568	-8,837,375	-13,227,182				
Inventory Depletion	0.000000	0	0	0				
Depreciation	0.040505	-461,917	-917,836	-1,373,755				
TOTAL PURCHASES	1.000000	-11,403,962	-22,659,820	-33,915,679				

Appendix C-4. Economic impact on the Mountain region from forage reductions in the ranching sector allowing hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Ranching	0.003022	-23,721	-46,995	-70,268	1.0037	-7,878,523	-15,608,395	-23,338,267
Other Agriculture	0.048164	-378,062	-748,991	-1,119,921	0.0492	-386,194	-765,102	-1,144,010
Timber Harvesting and Hauling	0.001912	-15,008	-29,733	-44,458	0.0073	-57,301	-113,521	-169,741
Lumber and Wood Products Processing	0.001561	-12,253	-24,275	-36,297	0.0040	-31,398	-62,203	-93,009
Agricultural Services	0.043254	-339,521	-672,637	-1,005,752	0.0453	-355,581	-704,454	-1,053,326
Construction and Related Services	0.046489	-364,914	-722,944	-1,080,973	0.0551	-432,506	-856,852	-1,281,198
Communications and Utilities	0.005590	-43,879	-86,929	-129,980	0.0122	-95,764	-189,720	-283,677
Finance, Insurance, and Real Estate	0.036085	-283,248	-561,153	-839,057	0.0595	-467,044	-925,276	-1,383,508
Medical Services	0.000572	-4,490	-8,895	-13,300	0.0212	-166,409	-329,678	-492,947
Other Professional Services	0.002667	-20,935	-41,474	-62,014	0.0066	-51,807	-102,636	-153,465
Automotive Sales and Supplies	0.041408	-325,031	-643,930	-962,828	0.0592	-464,689	-920,611	-1,376,532
Gasoline Services and Distribution	0.040250	-315,942	-625,922	-935,902	0.0612	-480,388	-951,712	-1,423,037
Lodging	0.000052	-408	-809	-1,209	0.0005	-3,925	-7,775	-11,626
Cafes and Taverns	0.000078	-612	-1,213	-1,814	0.0064	-50,237	-99,525	-148,814
Groceries	0.004741	-37,214	-73,727	-110,239	0.0554	-434,861	-861,517	-1,288,174
Hardware and Equipment Dealers	0.011801	-92,632	-183,516	-274,400	0.0251	-197,022	-390,327	-583,631
Other Wholesale and Retail Trade	0.004216	-33,093	-65,562	-98,031	0.0387	-303,775	-601,818	-899,861
Other Wholesale and Retail Services	0.000910	-7,143	-14,151	-21,160	0.0109	-85,559	-169,504	-253,449
City and County Government	0.040346	-316,695	-627,415	-938,135	0.0755	-592,636	-1,174,090	-1,755,544
Agencies of State and Federal Government	0.000783	-6,146	-12,176	-18,206	0.0044	-34,538	-68,424	-102,310
U.S. Forest Service	0.000000	0	0	0	0.0010	-7,849	-15,551	-23,252
Households	0.235592	-1,849,275	-3,663,657	-5,478,040	0.4018	-3,153,921	-6,248,334	-9,342,748
Woodlots	0.000000	0	0	0	0.0001	-785	-1,555	-2,325
Multiplier					2.0045	-15,734,283	-31,171,693	-46,609,103
\$/AUM Lost						75	75	75
Subtotal—All Local Sectors	0.569493	-4,470,224	-8,856,104	-13,241,984				
Nonlocal Households	0.023859	-187,281	-371,028	-554,775				
Nonlocal Government	0.050546	-396,760	-786,034	-1,175,307				
Nonlocal Business	0.315597	-2,477,272	-4,907,804	-7,338,335				
Subtotal—All Nonlocal Sectors	0.390002	-3,061,313	-6,064,865	-9,068,418				
Inventory Depletion	0.000000	0	0	0				
Depreciation	0.040505	-317,943	-629,887	-941,832				
TOTAL PURCHASES	1.000000	-7,849,480	-15,550,857	-23,252,234				



Appendix C-5. Economic impact on the North Central Plateau region from forage reductions in the ranching sector, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
(Public Land) Dependent Ranching	0.0000	0	0	0	1.0002	-6,504,508	-13,095,487	-19,599,742
(Private Land) Other Ranching	0.1124	-730,961	-1,471,638	-2,202,571	0.1324	-861,025	-1,733,496	-2,594,487
Irrigated Farming	0.0397	-258,177	-519,787	-777,954	0.0600	-390,192	-785,572	-1,175,749
Dryland Farming	0.0762	-495,544	-997,677	-1,493,202	0.0988	-642,517	-1,293,575	-1,936,067
Food Processing	0.0011	-7,154	-14,402	-21,555	0.0043	-27,964	-56,299	-84,262
Timber Industry	0.0185	-120,309	-242,218	-362,523	0.0340	-221,109	-445,158	-666,258
Agricultural Services	0.0588	-382,389	-769,861	-1,152,234	0.1365	-887,688	-1,787,177	-2,674,830
Construction and Related Services	0.0000	0	0	0	0.0070	-45,522	-91,650	-137,171
Manufacturing, Transportation, Utilities	0.0359	-233,465	-470,034	-703,490	0.0497	-323,209	-650,716	-973,912
Finance, Insurance, Real Estate	0.0381	-247,772	-498,838	-746,601	0.0720	-468,231	-942,687	-1,410,899
Professional Services	0.0000	0	0	0	0.0013	-8,454	-17,021	-25,475
Automotive Sales and Services	0.0568	-369,382	-743,675	-1,113,043	0.0819	-532,613	-1,072,306	-1,604,898
Lodging, Cafes, Taverns	0.0000	0	0	0	0.0038	-24,712	-49,753	-74,464
Other Wholesale and Retail Trade	0.0496	-322,559	-649,406	-971,953	0.0821	-533,913	-1,074,924	-1,608,817
Other Wholesale and Retail Services	0.0074	-48,124	-96,887	-145,009	0.0172	-111,855	-225,197	-337,048
City and County Government	0.0158	-102,751	-206,867	-309,614	0.0320	-208,103	-418,972	-627,066
Agencies of State and Federal Government	0.0000	0	0	0	0.0025	-16,258	-32,732	-48,990
Federal Land Management Agencies	0.0000	0	0	0	0.0001	-650	-1,309	-1,960
Households	0.1162	-755,673	-1,521,391	-2,277,035	0.2796	-1,818,297	-3,660,766	-5,478,992
Multiplier					2.0954	-13,626,821	-27,434,797	-41,061,088
\$/AUM Lost						59	59	59
Subtotal—All Local Sectors	0.6264	-4,073,609	-8,201,373	-12,274,824				
Nonlocal Households	0.0538	-349,873	-704,396	-1,054,255				
Nonlocal Government	0.0891	-579,436	-1,166,575	-1,745,988				
Nonlocal Business	0.1992	-1,295,439	-2,608,099	-3,903,488				
Subtotal—All Nonlocal Sectors	0.3422	-2,225,398	-4,480,380	-6,705,691				
Inventory Depletion	0.0000	0	0	0				
Depreciation	0.0314	-204,201	-411,116	-615,309				
TOTAL PURCHASES	1.0000	-6,503,208	-13,092,868	-19,595,823				

Appendix D-1. Economic impact on the High Desert region from livestock price changes in the livestock production, procurement, and feeding sector.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Output Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
Livestock Production, Procurement, and Feeding	0.109787	920,835	1,841,669	2,762,504	1.1237	9,424,996	18,849,991	28,274,987
Crop Production	0.085945	720,861	1,441,722	2,162,582	0.1085	910,040	1,820,080	2,730,120
Food Crop Procurement and Food Processing	0.010094	84,663	169,326	253,989	0.0137	114,908	229,817	344,725
Agricultural Services	0.026867	225,346	450,692	676,038	0.0527	442,019	884,039	1,326,058
Communications and Utilities	0.006656	55,827	111,654	167,481	0.0317	265,883	531,765	797,648
Financial Services	0.009047	75,881	151,763	227,644	0.0175	146,781	293,561	440,342
Insurance and Real Estate	0.004962	41,619	83,237	124,856	0.0122	102,327	204,654	306,981
Medical and Related Services	0.000333	2,793	5,586	8,379	0.0251	210,525	421,051	631,576
Other Professional Services	0.004334	36,351	72,703	109,054	0.0094	78,842	157,684	236,527
Automotive and Gasoline Sales and Supplies	0.004667	39,144	78,289	117,433	0.0332	278,464	556,928	835,392
Transportation	0.009382	78,691	157,382	236,074	0.0126	105,682	211,364	317,046
Construction, Mining, and Manufacturing	0.009981	83,715	167,431	251,146	0.0412	345,564	691,127	1,036,691
Wholesale and Retail Hardware Trade	0.005836	48,949	97,899	146,848	0.0124	104,005	208,009	312,014
Wholesale and Retail Equipment Dealers	0.008409	70,530	141,060	211,591	0.0135	113,231	226,462	339,692
Wholesale and Retail Groceries and Supermarkets	0.002267	19,014	38,029	57,043	0.0505	423,567	847,134	1,270,701
Lodging and Dining Establishments	0.000192	1,610	3,221	4,831	0.0063	52,841	105,682	158,523
Other Wholesale and Retail Trade	0.002291	19,216	38,431	57,647	0.0304	254,979	509,958	764,937
Other Wholesale and Retail Services	0.000783	6,567	13,135	19,702	0.0138	115,747	231,494	347,241
City and County Government	0.008645	72,510	145,019	217,529	0.0497	416,857	833,714	1,250,571
Agencies of State and Federal Government	0.000152	1,275	2,550	3,825	0.0026	21,807	43,615	65,422
Bureau of Land Management	0.007157	60,029	120,058	180,087	0.0081	67,938	135,877	203,815
Households	0.189505	1,589,467	3,178,934	4,768,400	0.3629	3,043,811	6,087,623	9,131,434
Multiplier					2.0316	17,039,976	34,079,952	51,119,928
Subtotal—All Local Sectors	0.507299	4,254,953	8,509,906	12,764,859				
Nonlocal Households	0.009024	75,688	151,377	227,065				
Nonlocal Government	0.038741	324,939	649,878	974,816				
Nonlocal Business	0.405589	3,401,864	6,803,728	10,205,592				
Subtotal—All Nonlocal Sectors	0.453354	3,802,491	7,604,983	11,407,474				
Inventory Depletion	0.026578	222,922	445,844	668,766				
Depreciation	0.012769	107,100	214,199	321,299				
<b>TOTAL PURCHASES</b>	<b>1.000000</b>	<b>8,387,466</b>	<b>16,774,932</b>	<b>25,162,398</b>				

Appendix D-2. Economic impact on the Mountain region from livestock price changes in the ranching sector.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Gross Income Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
Ranching	0.003022	13,611	27,069	40,527	1.0037	4,520,701	8,990,420	13,460,139
Other Agriculture	0.048164	216,932	431,418	645,904	0.0492	221,599	440,698	659,798
Timber Harvesting and Hauling	0.001912	8,612	17,126	25,641	0.0073	32,879	65,388	97,897
Lumber and Wood Products Processing	0.001561	7,031	13,982	20,934	0.0040	18,016	35,829	53,642
Agricultural Services	0.043254	194,818	387,438	580,059	0.0453	204,033	405,765	607,497
Construction and Related Services	0.046489	209,388	416,415	623,442	0.0551	248,172	493,546	738,920
Communications and Utilities	0.005590	25,178	50,071	74,965	0.0122	54,949	109,279	163,608
Finance, Insurance, and Real Estate	0.036085	162,528	323,223	483,919	0.0595	267,990	532,958	797,926
Medical Services	0.000572	2,576	5,124	7,671	0.0212	95,486	189,894	284,303
Other Professional Services	0.002667	12,012	23,889	35,766	0.0066	29,727	59,118	88,509
Automotive Sales and Supplies	0.041408	186,503	370,903	555,303	0.0592	266,639	530,271	793,903
Gasoline Services and Distribution	0.040250	181,287	360,530	539,773	0.0612	275,647	548,185	820,724
Lodging	0.000052	234	466	697	0.0005	2,252	4,479	6,705
Cafes and Taverns	0.000078	351	699	1,046	0.0064	28,826	57,327	85,827
Groceries	0.004741	21,354	42,466	63,579	0.0554	249,524	496,233	742,943
Hardware and Equipment Dealers	0.011801	53,152	105,705	158,258	0.0251	113,051	224,828	336,604
Other Wholesale and Retail Trade	0.004216	18,989	37,764	56,539	0.0387	174,306	346,647	518,987
Other Wholesale and Retail Services	0.000910	4,099	8,151	12,204	0.0109	49,094	97,634	146,175
City and County Government	0.040346	181,720	361,390	541,061	0.0755	340,055	676,275	1,012,494
Agencies of State and Federal Government	0.000783	3,527	7,014	10,500	0.0044	19,818	39,412	59,006
U.S. Forest Service	0.000000	-	-	-	0.0010	4,504	8,957	13,411
Households	0.235592	1,061,115	2,110,263	3,159,411	0.4018	1,809,722	3,599,034	5,388,347
Woodlots	0.000000	-	-	-	0.0001	450	896	1,341
Multiplier					2.0045	9,028,341	17,954,865	26,881,388
Subtotal—All Local Sectors	0.569493	2,565,017	5,101,107	7,637,197				
Nonlocal Households	0.023859	107,462	213,712	319,962				
Nonlocal Government	0.050546	227,661	452,755	677,848				
Nonlocal Business	0.315597	1,421,460	2,826,890	4,232,320				
Subtotal—All Nonlocal Sectors	0.390002	1,756,583	3,493,356	5,230,130				
Inventory Depletion	0.000000	-	-	-				
Depreciation	0.040505	182,436	362,815	543,193				
<b>TOTAL PURCHASES</b>	<b>1.000000</b>	<b>4,504,036</b>	<b>8,957,278</b>	<b>13,410,520</b>				

Appendix D-3. Economic impact on the North Central Plateau region from livestock price changes in the ranching sector.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Output Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
(Public Land) Dependent Ranching	0.0000	-	-	-	1.0002	2,622,602	5,208,477	7,794,352
(Private Land) Other Ranching	0.1124	294,722	585,316	875,910	0.1324	347,163	689,464	1,031,766
Irrigated Farming	0.0397	104,096	206,735	309,374	0.0600	157,325	312,446	467,568
Dryland Farming	0.0762	199,802	396,807	593,811	0.0988	259,061	514,495	769,928
Food Processing	0.0011	2,884	5,728	8,572	0.0043	11,275	22,392	33,509
Timber Industry	0.0185	48,508	96,338	144,167	0.0340	89,151	177,053	264,955
Agricultural Services	0.0588	154,178	306,197	458,216	0.1365	357,914	710,815	1,063,716
Construction and Related Services	0.0000	-	-	-	0.0070	18,355	36,452	54,550
Manufacturing, Transportation, Utilities	0.0359	94,133	186,947	279,761	0.0497	130,317	258,810	387,302
Finance, Insurance, Real Estate	0.0381	99,901	198,403	296,905	0.0720	188,790	374,935	561,081
Professional Services	0.0000	-	-	-	0.0013	3,409	6,770	10,131
Automotive Sales and Services	0.0568	148,934	295,782	442,631	0.0819	214,748	426,489	638,230
Lodging, Cafes, Taverns	0.0000	-	-	-	0.0038	9,964	19,788	29,613
Other Wholesale and Retail Trade	0.0496	130,055	258,289	386,523	0.0821	215,273	427,530	639,788
Other Wholesale and Retail Services	0.0074	19,403	38,535	57,667	0.0172	45,100	89,568	134,036
City and County Government	0.0158	41,429	82,277	123,126	0.0320	83,906	166,638	249,369
Agencies of State and Federal Government	0.0000	-	-	-	0.0025	6,555	13,019	19,482
Federal Land Management Agencies	0.0000	-	-	-	0.0001	262	521	779
Households	0.1162	304,685	605,104	905,523	0.2796	733,133	1,455,999	2,178,865
Multiplier					2.0954	5,494,302	10,911,660	16,329,019
Subtotal—All Local Sectors	0.6264	1,642,469	3,261,938	4,881,406				
Nonlocal Households	0.0538	141,068	280,160	419,252				
Nonlocal Government	0.0891	233,627	463,982	694,338				
Nonlocal Business	0.1992	522,318	1,037,321	1,552,324				
Subtotal—All Nonlocal Sectors	0.3422	897,275	1,781,984	2,666,694				
Inventory Depletion	0.0000	-	-	-				
Depreciation	0.0314	82,333	163,513	244,694				
<b>TOTAL PURCHASES</b>	<b>1.0000</b>	<b>2,622,078</b>	<b>5,207,435</b>	<b>7,792,793</b>				

Appendix E-1. Malheur County Livestock Production, Procurement, and Feeding—Forage reduction impacts on a single 350-cow beef cattle ranch, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Livestock Production, Procurement, and Feeding	0.109787	-2,540	-5,115	-7,620	1.1237	-25,997	-52,355	-77,991
Crop Production	0.085945	-1,988	-4,004	-5,965	0.1085	-2,510	-5,055	-7,531
Food Crop Procurement and Food Processing	0.010094	-234	-470	-701	0.0137	-317	-638	-951
Agricultural Services	0.026867	-622	-1,252	-1,865	0.0527	-1,219	-2,455	-3,658
Communications and Utilities	0.006656	-154	-310	-462	0.0317	-733	-1,477	-2,200
Financial Services	0.009047	-209	-422	-628	0.0175	-405	-815	-1,215
Insurance and Real Estate	0.004962	-115	-231	-344	0.0122	-282	-568	-847
Medical and Related Services	0.000333	-8	-16	-23	0.0251	-581	-1,169	-1,742
Other Professional Services	0.004334	-100	-202	-301	0.0094	-217	-438	-652
Automotive and Gasoline Sales and Supplies	0.004667	-108	-217	-324	0.0332	-768	-1,547	-2,304
Transportation	0.009382	-217	-437	-651	0.0126	-292	-587	-875
Construction, Mining, and Manufacturing	0.009981	-231	-465	-693	0.0412	-953	-1,920	-2,860
Wholesale and Retail Hardware Trade	0.005836	-135	-272	-405	0.0124	-287	-578	-861
Wholesale and Retail Equipment Dealers	0.008409	-195	-392	-584	0.0135	-312	-629	-937
Wholesale and Retail Groceries and Supermarkets	0.002267	-52	-106	-157	0.0505	-1,168	-2,353	-3,505
Lodging and Dining Establishments	0.000192	-4	-9	-13	0.0063	-146	-294	-437
Other Wholesale and Retail Trade	0.002291	-53	-107	-159	0.0304	-703	-1,416	-2,110
Other Wholesale and Retail Services	0.000783	-18	-36	-54	0.0138	-319	-643	-958
City and County Government	0.008645	-200	-403	-600	0.0497	-1,150	-2,316	-3,449
Agencies of State and Federal Government	0.000152	-4	-7	-11	0.0026	-60	-121	-180
Bureau of Land Management	0.007157	-166	-333	-497	0.0081	-187	-377	-562
Households	0.189505	-4,384	-8,829	-13,153	0.3629	-8,396	-16,908	-25,187
Multiplier						0	0	0
\$/AUM Lost					2.0316	-47,002	-94,656	-141,005
						63	63	63
Subtotal—All Local Sectors	0.507299	-11,736	-23,636	-35,209				
Nonlocal Households	0.009024	-209	-420	-626				
Nonlocal Government	0.038741	-896	-1,805	-2,689				
Nonlocal Business	0.405589	-9,383	-18,897	-28,150				
Subtotal—All Nonlocal Sectors	0.453354	-10,488	-21,123	-31,465				
Inventory Depletion	0.026578	-615	-1,238	-1,845				
Depreciation	0.012769	-295	-595	-886				
TOTAL PURCHASES	1.000000	-23,135	-46,592	-69,406				

Appendix E-2. Malheur County Livestock Production, Procurement, and Feeding—Forage reduction impacts on a single 350-cow beef cattle ranch, allowing hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Livestock Production, Procurement, and Feeding	0.109787	-1,811	-3,623	-5,468	1.1237	-18,536	-37,078	-55,964
Crop Production	0.085945	-1,418	-2,836	-4,280	0.1085	-1,790	-3,580	-5,404
Food Crop Procurement and Food Processing	0.010094	-167	-333	-503	0.0137	-226	-452	-682
Agricultural Services	0.026867	-443	-887	-1,338	0.0527	-869	-1,739	-2,625
Communications and Utilities	0.006656	-110	-220	-331	0.0317	-523	-1,046	-1,579
Financial Services	0.009047	-149	-299	-451	0.0175	-289	-577	-872
Insurance and Real Estate	0.004962	-82	-164	-247	0.0122	-201	-403	-608
	0.000333	-5	-11	-17	0.0251	-414	-828	-1,250
Medical and Related Services	0.004334	-71	-143	-216	0.0094	-155	-310	-468
Other Professional Services	0.004667	-77	-154	-232	0.0332	-548	-1,095	-1,653
Automotive and Gasoline Sales and Supplies	0.009382	-155	-310	-467	0.0126	-208	-416	-628
Transportation	0.009981	-165	-329	-497	0.0412	-680	-1,359	-2,052
Construction, Mining, and Manufacturing	0.005836	-96	-193	-291	0.0124	-205	-409	-618
Wholesale and Retail Hardware Trade	0.008409	-139	-277	-419	0.0135	-223	-445	-672
Wholesale and Retail Equipment Dealers	0.002267	-37	-75	-113	0.0505	-833	-1,666	-2,515
Wholesale and Retail Groceries and Supermarkets	0.000192	-3	-6	-10	0.0063	-104	-208	-314
Lodging and Dining Establishments	0.002291	-38	-76	-114	0.0304	-501	-1,003	-1,514
Other Wholesale and Retail Trade	0.000783	-13	-26	-39	0.0138	-228	-455	-687
Other Wholesale and Retail Services	0.008645	-143	-285	-431	0.0497	-820	-1,640	-2,475
City and County Government	0.000152	-3	-5	-8	0.0026	-43	-86	-129
Agencies of State and Federal Government	0.007157	-118	-236	-356	0.0081	-134	-267	-403
Bureau of Land Management	0.189505	-3,126	-6,253	-9,438	0.3629	-5,986	-11,975	-18,074
Households								
					2.0316	-33,513	-67,036	-101,181
Multiplier						62	62	63
\$/AUM Lost								
	0.507299	-8,368	-16,739	-25,265				
Subtotal—All Local Sectors								
	0.009024	-149	-298	-449				
Nonlocal Households	0.038741	-639	-1,278	-1,929				
Nonlocal Government	0.405589	-6,691	-13,383	-20,200				
Nonlocal Business								
	0.453354	-7,478	-14,959	-22,579				
Subtotal—All Nonlocal Sectors								
	0.026578	-438	-877	-1,324				
Inventory Depletion	0.012769	-211	-421	-636				
Depreciation								
<b>TOTAL PURCHASES</b>	<b>1.000000</b>	<b>-16,496</b>	<b>-32,997</b>	<b>-49,804</b>				

Appendix E-3. Grant County Ranching—Forage reduction impacts on a single 300-cow beef cattle ranch, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Ranching	0.003022	-81	-161	-241	1.0037	-26,932	-53,514	-80,097
Other Agriculture	0.048164	-1,292	-2,568	-3,844	0.0492	-1,320	-2,623	-3,926
Timber Harvesting and Hauling	0.001912	-51	-102	-153	0.0073	-196	-389	-583
Lumber and Wood Products Processing	0.001561	-42	-83	-125	0.0040	-107	-213	-319
Agricultural Services	0.043254	-1,161	-2,306	-3,452	0.0453	-1,216	-2,415	-3,615
Construction and Related Services	0.046489	-1,247	-2,479	-3,710	0.0551	-1,478	-2,938	-4,397
Communications and Utilities	0.005590	-150	-298	-446	0.0122	-327	-650	-974
Finance, Insurance, and Real Estate	0.036085	-968	-1,924	-2,880	0.0595	-1,597	-3,172	-4,748
Medical Services	0.000572	-15	-30	-46	0.0212	-569	-1,130	-1,692
Other Professional Services	0.002667	-72	-142	-213	0.0066	-177	-352	-527
Automotive Sales and Supplies	0.041408	-1,111	-2,208	-3,304	0.0592	-1,589	-3,156	-4,724
Gasoline Services and Distribution	0.040250	-1,080	-2,146	-3,212	0.0612	-1,642	-3,263	-4,884
Lodging	0.000052	-1	-3	-4	0.0005	-13	-27	-40
Cafes and Taverns	0.000078	-2	-4	-6	0.0064	-172	-341	-511
Groceries	0.004741	-127	-253	-378	0.0554	-1,487	-2,954	-4,421
Hardware and Equipment Dealers	0.011801	-317	-629	-942	0.0251	-674	-1,338	-2,003
Other Wholesale and Retail Trade	0.004216	-113	-225	-336	0.0387	-1,038	-2,063	-3,088
Other Wholesale and Retail Services	0.000910	-24	-49	-73	0.0109	-292	-581	-870
City and County Government	0.040346	-1,083	-2,151	-3,220	0.0755	-2,026	-4,025	-6,025
Agencies of State and Federal Government	0.000783	-21	-42	-62	0.0044	-118	-235	-351
U.S. Forest Service	0.000000	0	0	0	0.0010	-27	-53	-80
Households	0.235592	-6,322	-12,561	-18,801	0.4018	-10,781	-21,423	-32,064
Woodlots	0.000000	0	0	0	0.0001	-3	-5	-8
Multiplier					2.0045	-53,786	-106,874	-159,962
\$/AUM Lost						75	75	75
Subtotal—All Local Sectors	0.569493	-15,281	-30,364	-45,446				
Nonlocal Households	0.023859	-640	-1,272	-1,904				
Nonlocal Government	0.050546	-1,356	-2,695	-4,034				
Nonlocal Business	0.315597	-8,468	-16,827	-25,185				
Subtotal—All Nonlocal Sectors	0.390002	-10,465	-20,794	-31,123				
Inventory Depletion	0.000000	0	0	0				
Depreciation	0.040505	-1,087	-2,160	-3,232				
TOTAL PURCHASES	1.000000	-26,833	-53,317	-79,802				

Appendix E-4. Grant County Ranching—Forage reduction impacts on a single 300-cow beef cattle ranch, allowing hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
Ranching	0.003022	-56	-111	-165	1.0037	-18,538	-36,726	-54,914
Other Agriculture	0.048164	-890	-1,762	-2,635	0.0492	-909	-1,800	-2,692
Timber Harvesting and Hauling	0.001912	-35	-70	-105	0.0073	-135	-267	-399
Lumber and Wood Products Processing	0.001561	-29	-57	-85	0.0040	-74	-146	-219
Agricultural Services	0.043254	-799	-1,583	-2,366	0.0453	-837	-1,658	-2,478
Construction and Related Services	0.046489	-859	-1,701	-2,543	0.0551	-1,018	-2,016	-3,015
Communications and Utilities	0.005590	-103	-205	-306	0.0122	-225	-446	-667
Finance, Insurance, and Real Estate	0.036085	-666	-1,320	-1,974	0.0595	-1,099	-2,177	-3,255
Medical Services	0.000572	-11	-21	-31	0.0212	-392	-776	-1,160
Other Professional Services	0.002667	-49	-98	-146	0.0066	-122	-241	-361
Automotive Sales and Supplies	0.041408	-765	-1,515	-2,265	0.0592	-1,093	-2,166	-3,239
Gasoline Services and Distribution	0.040250	-743	-1,473	-2,202	0.0612	-1,130	-2,239	-3,348
Lodging	0.000052	-1	-2	-3	0.0005	-9	-18	-27
Cafes and Taverns	0.000078	-1	-3	-4	0.0064	-118	-234	-350
Groceries	0.004741	-88	-173	-259	0.0554	-1,023	-2,027	-3,031
Hardware and Equipment Dealers	0.011801	-218	-432	-646	0.0251	-464	-918	-1,373
Other Wholesale and Retail Trade	0.004216	-78	-154	-231	0.0387	-715	-1,416	-2,117
Other Wholesale and Retail Services	0.000910	-17	-33	-50	0.0109	-201	-399	-596
City and County Government	0.040346	-745	-1,476	-2,207	0.0755	-1,394	-2,763	-4,131
Agencies of State and Federal Government	0.000783	-14	-29	-43	0.0044	-81	-161	-241
U.S. Forest Service	0.000000	0	0	0	0.0010	-18	-37	-55
Households	0.235592	-4,351	-8,620	-12,890	0.4018	-7,421	-14,702	-21,983
Woodlots	0.000000	0	0	0	0.0001	-2	-4	-5
Multiplier					2.0045	-37,022	-73,345	-109,668
\$/AUM Lost						75	75	75
Subtotal—All Local Sectors	0.569493	-10,518	-20,838	-31,158				
Nonlocal Households	0.023859	-441	-873	-1,305				
Nonlocal Government	0.050546	-934	-1,849	-2,765				
Nonlocal Business	0.315597	-5,829	-11,548	-17,267				
Subtotal—All Nonlocal Sectors	0.390002	-7,203	-14,270	-21,337				
Inventory Depletion	0.000000	0	0	0				
Depreciation	0.040505	-748	-1,482	-2,216				
TOTAL PURCHASES	1.000000	-18,469	-36,590	-54,711				



Appendix E-5. Morrow County Ranching—Forage reduction impacts on a single 300-cow beef cattle ranch, no hay substitution.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) % Range and Federal Reduction			Direct Plus Indirect Coefficients	Final Output Effect (\$) % Range and Federal Reduction		
		25	50	75		25	50	75
(Public Land) Dependent Ranching	0.0000	0	0	0	1.0002	-23,914	-48,145	-72,058
(Private Land) Other Ranching	0.1124	-2,687	-5,410	-8,098	0.1324	-3,166	-6,373	-9,539
Irrigated Farming	0.0397	-949	-1,911	-2,860	0.0600	-1,435	-2,888	-4,323
Dryland Farming	0.0762	-1,822	-3,668	-5,490	0.0988	-2,362	-4,756	-7,118
Food Processing	0.0011	-26	-53	-79	0.0043	-103	-207	-310
Timber Industry	0.0185	-442	-891	-1,333	0.0340	-813	-1,637	-2,449
Agricultural Services	0.0588	-1,406	-2,830	-4,236	0.1365	-3,264	-6,571	-9,834
Construction and Related Services	0.0000	0	0	0	0.0070	-167	-337	-504
Manufacturing, Transportation, Utilities	0.0359	-858	-1,728	-2,586	0.0497	-1,188	-2,392	-3,581
Finance, Insurance, Real Estate	0.0381	-911	-1,834	-2,745	0.0720	-1,721	-3,466	-5,187
Professional Services	0.0000	0	0	0	0.0013	-31	-63	-94
Automotive Sales and Services	0.0568	-1,358	-2,734	-4,092	0.0819	-1,958	-3,942	-5,900
Lodging, Cafes, Taverns	0.0000	0	0	0	0.0038	-91	-183	-274
Other Wholesale and Retail Trade	0.0496	-1,186	-2,388	-3,573	0.0821	-1,963	-3,952	-5,915
Other Wholesale and Retail Services	0.0074	-177	-356	-533	0.0172	-411	-828	-1,239
City and County Government	0.0158	-378	-761	-1,138	0.0320	-765	-1,540	-2,305
Agencies of State and Federal Government	0.0000	0	0	0	0.0025	-60	-120	-180
Federal Land Management Agencies	0.0000	0	0	0	0.0001	-2	-5	-7
Households	0.1162	-2,778	-5,593	-8,371	0.2796	-6,685	-13,459	-20,143
Multiplier					2.0954	-50,099	-100,863	-150,960
\$/AUM Lost						59	59	59
Subtotal—All Local Sectors	0.6264	-14,977	-30,152	-45,128				
Nonlocal Households	0.0538	-1,286	-2,590	-3,876				
Nonlocal Government	0.0891	-2,130	-4,289	-6,419				
Nonlocal Business	0.1992	-4,763	-9,589	-14,351				
Subtotal—All Nonlocal Sectors	0.3422	-8,182	-16,472	-24,653				
Inventory Depletion	0.0000	0	0	0				
Depreciation	0.0314	-751	-1,511	-2,262				
TOTAL PURCHASES	1.0000	-23,909	-48,136	-72,043				

Appendix F-1. Malheur County Livestock Production, Procurement, and Feeding—Price change impacts on a single 350-cow beef cattle ranch.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Output Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
Livestock Production, Procurement, and Feeding	0.109787	1,236	2,472	3,708	1.1237	12,651	25,302	37,953
Crop Production	0.085945	968	1,935	2,903	0.1085	1,222	2,443	3,665
Food Crop Procurement and Food Processing	0.010094	114	227	341	0.0137	154	308	463
Agricultural Services	0.026867	302	605	907	0.0527	593	1,187	1,780
Communications and Utilities	0.006656	75	150	225	0.0317	357	714	1,071
Financial Services	0.009047	102	204	306	0.0175	197	394	591
Insurance and Real Estate	0.004962	56	112	168	0.0122	137	275	412
Medical and Related Services	0.000333	4	7	11	0.0251	283	565	848
Other Professional Services	0.004334	49	98	146	0.0094	106	212	317
Automotive and Gasoline Sales and Supplies	0.004667	53	105	158	0.0332	374	748	1,121
Transportation	0.009382	106	211	317	0.0126	142	284	426
Construction, Mining, and Manufacturing	0.009981	112	225	337	0.0412	464	928	1,392
Wholesale and Retail Hardware Trade	0.005836	66	131	197	0.0124	140	279	419
Wholesale and Retail Equipment Dealers	0.008409	95	189	284	0.0135	152	304	456
Wholesale and Retail Groceries and Supermarkets	0.002267	26	51	77	0.0505	569	1,137	1,706
Lodging and Dining Establishments	0.000192	2	4	6	0.0063	71	142	213
Other Wholesale and Retail Trade	0.002291	26	52	77	0.0304	342	685	1,027
Other Wholesale and Retail Services	0.000783	9	18	26	0.0138	155	311	466
City and County Government	0.008645	97	195	292	0.0497	560	1,119	1,679
Agencies of State and Federal Government	0.000152	2	3	5	0.0026	29	59	88
Bureau of Land Management	0.007157	81	161	242	0.0081	91	182	274
Households	0.189505	2,134	4,267	6,401	0.3629	4,086	8,171	12,257
Multiplier					2.0316	22,872	45,745	68,617
Subtotal—All Local Sectors	0.507299	5,711	11,423	17,134				
Nonlocal Households	0.009024	102	203	305				
Nonlocal Government	0.038741	436	872	1,308				
Nonlocal Business	0.405589	4,566	9,133	13,699				
Subtotal—All Nonlocal Sectors	0.453354	5,104	10,208	15,312				
Inventory Depletion	0.026578	299	598	898				
Depreciation	0.012769	144	288	431				
<b>TOTAL PURCHASES</b>	<b>1.000000</b>	<b>11,258</b>	<b>22,517</b>	<b>33,775</b>				

Appendix F-1. Malheur County Livestock Production, Procurement, and Feeding—Price change impacts on a single 350-cow beef cattle ranch.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Output Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
Livestock Production, Procurement, and Feeding	0.109787	1,236	2,472	3,708	1.1237	12,651	25,302	37,953
Crop Production	0.085945	968	1,935	2,903	0.1085	1,222	2,443	3,665
Food Crop Procurement and Food Processing	0.010094	114	227	341	0.0137	154	308	463
Agricultural Services	0.026867	302	605	907	0.0527	593	1,187	1,780
Communications and Utilities	0.006656	75	150	225	0.0317	357	714	1,071
Financial Services	0.009047	102	204	306	0.0175	197	394	591
Insurance and Real Estate	0.004962	56	112	168	0.0122	137	275	412
Medical and Related Services	0.000333	4	7	11	0.0251	283	565	848
Other Professional Services	0.004334	49	98	146	0.0094	106	212	317
Automotive and Gasoline Sales and Supplies	0.004667	53	105	158	0.0332	374	748	1,121
Transportation	0.009382	106	211	317	0.0126	142	284	426
Construction, Mining, and Manufacturing	0.009981	112	225	337	0.0412	464	928	1,392
Wholesale and Retail Hardware Trade	0.005836	66	131	197	0.0124	140	279	419
Wholesale and Retail Equipment Dealers	0.008409	95	189	284	0.0135	152	304	456
Wholesale and Retail Groceries and Supermarkets	0.002267	26	51	77	0.0505	569	1,137	1,706
Lodging and Dining Establishments	0.000192	2	4	6	0.0063	71	142	213
Other Wholesale and Retail Trade	0.002291	26	52	77	0.0304	342	685	1,027
Other Wholesale and Retail Services	0.000783	9	18	26	0.0138	155	311	466
City and County Government	0.008645	97	195	292	0.0497	560	1,119	1,679
Agencies of State and Federal Government	0.000152	2	3	5	0.0026	29	59	88
Bureau of Land Management	0.007157	81	161	242	0.0081	91	182	274
Households	0.189505	2,134	4,267	6,401	0.3629	4,086	8,171	12,257
Multiplier					2.0316	22,872	45,745	68,617
Subtotal—All Local Sectors	0.507299	5,711	11,423	17,134				
Nonlocal Households	0.009024	102	203	305				
Nonlocal Government	0.038741	436	872	1,308				
Nonlocal Business	0.405589	4,566	9,133	13,699				
Subtotal—All Nonlocal Sectors	0.453354	5,104	10,208	15,312				
Inventory Depletion	0.026578	299	598	898				
Depreciation	0.012769	144	288	431				
TOTAL PURCHASES	1.000000	11,258	22,517	33,775				

Appendix F-2. Grant County Ranching—Price change impacts on a single 300-cow beef cattle ranch.

Purchases From:	Direct Coefficients	First-round Spending Impact (\$) Price Changes Plus or Minus			Direct Plus Indirect Coefficients	Final Output Effect (\$) Price Changes Plus or Minus		
		10%	20%	30%		10%	20%	30%
Ranching	0.003022	32	64	95	1.0037	10,640	21,145	31,650
Other Agriculture	0.048164	511	1,015	1,519	0.0492	522	1,037	1,551
Timber Harvesting and Hauling	0.001912	20	40	60	0.0073	77	154	230
Lumber and Wood Products Processing	0.001561	17	33	49	0.0040	42	84	126
Agricultural Services	0.043254	459	911	1,364	0.0453	480	954	1,428
Construction and Related Services	0.046489	493	979	1,466	0.0551	584	1,161	1,738
Communications and Utilities	0.005590	59	118	176	0.0122	129	257	385
Finance, Insurance, and Real Estate	0.036085	383	760	1,138	0.0595	631	1,254	1,876
Medical Services	0.000572	6	12	18	0.0212	225	447	669
Other Professional Services	0.002667	28	56	84	0.0066	70	139	208
Automotive Sales and Supplies	0.041408	439	872	1,306	0.0592	628	1,247	1,867
Gasoline Services and Distribution	0.040250	427	848	1,269	0.0612	649	1,289	1,930
Lodging	0.000052	1	1	2	0.0005	5	11	16
Cafes and Taverns	0.000078	1	2	2	0.0064	68	135	202
Groceries	0.004741	50	100	150	0.0554	587	1,167	1,747
Hardware and Equipment Dealers	0.011801	125	249	372	0.0251	266	529	791
Other Wholesale and Retail Trade	0.004216	45	89	133	0.0387	410	815	1,220
Other Wholesale and Retail Services	0.000910	10	19	29	0.0109	116	230	344
City and County Government	0.040346	428	850	1,272	0.0755	800	1,591	2,381
Agencies of State and Federal Government	0.000783	8	16	25	0.0044	47	93	139
U.S. Forest Service	0.000000	-	-	-	0.0010	11	21	32
Households	0.235592	2,498	4,963	7,429	0.4018	4,260	8,465	12,670
Woodlots	0.000000	-	-	-	0.0001	1	2	3
Multiplier					2.0045	21,250	42,230	63,209
Subtotal—All Local Sectors	0.569493	6,037	11,998	17,958				
Nonlocal Households	0.023859	253	503	752				
Nonlocal Government	0.050546	536	1,065	1,594				
Nonlocal Business	0.315597	3,346	6,649	9,952				
Subtotal—All Nonlocal Sectors	0.390002	4,135	8,216	12,298				
Inventory Depletion	0.000000	-	-	-				
Depreciation	0.040505	429	853	1,277				
<b>TOTAL PURCHASES</b>	<b>1.000000</b>	<b>10,601</b>	<b>21,068</b>	<b>31,534</b>				

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