

Understanding Elk-Related Costs on Private Lands for Livestock Producers in Northern New Mexico Mountain Regions (Series 2 of 2)

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This guide provides economic data and valuation methods related to elk-related costs on private lands used for livestock production in the Northern New Mexico mountain regions. Its purpose is to assist livestock producers in understanding, documenting, and communicating the economic impacts of elk use on lands designated for livestock production. The guide also serves as a technical reference for federal and state agencies in New Mexico, providing a consistent, transparent framework for evaluating elk-related costs on private lands. The guide is not intended to inform policy decisions or to evaluate wildlife management actions.

The livestock enterprise budget presented in Series 1 serves as the baseline cost structure for this series, which evaluates and quantifies elk-related economic impacts on private-land livestock operations.¹

1. LIVESTOCK PRODUCTION SYSTEMS IN NORTHERN MOUNTAIN REGIONS

In the Northern mountain regions of New Mexico, livestock production is primarily based on small-scale cow-calf operations. Most producers manage breeding herds of fewer than 50 cows and rely on a seasonal combination of public and private land use. Livestock typically graze on higher-elevation public lands during the summer months (generally above 8,000 feet), while winter feeding occurs on private lands from October through May.

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Private land plays a critical role in these production systems. Producers typically own relatively small acreages, between 20 to 50 acres, used for both hay production and winter grazing. Alfalfa is the primary forage crop and is commonly grown under irrigated systems. This homegrown hay serves as the main winter feed source for livestock.

Due to the small scale and remote location of these operations, opportunities to rent machinery are limited. As a result, producers typically own their tractors and associated equipment, which increases machinery ownership and maintenance costs relative to the size of the operation.

Irrigation water is commonly delivered through acequia systems. While acequia water generally does not involve direct water charges, it requires substantial labor for maintenance and management. This labor commitment represents an additional, often under-recognized, cost of private land forage production in the region.¹

2. ELK PRESENCE ON PRIVATE LANDS

Elk typically exhibit seasonal grazing patterns occupying public lands during spring and summer, then shifting to private lands from fall through winter. This seasonal movement is driven by forage quality and availability, human presence, and predation risk. On private lands, elk concentrate in irrigated hay fields (particularly alfalfa), private pastures, and livestock grazing areas, locations that offer high-quality, easily accessible forage with minimal human disturbance. Elk also generally avoid human presence and are most active at night and in the early morning. As a result, elk are often observed in large groups, ranging from 80 to 300 animals grazing on these private lands.

3. CATEGORIES OF OBSERVABLE ELK-RELATED COSTS ON LIVESTOCK OPERATIONS

Elk damage on private agricultural lands is well documented in the scientific and Extension literature. Studies have consistently reported elk depredation on forage crops and stored hay, competition with livestock for forage, and damage to fencing and irrigation systems, leading to measurable economic impacts for producers.²⁻⁴ The following impacts are commonly observed on private lands in northern New Mexico.

3.1 Forage and stored feed loss

Elk impose a high cost on northern New Mexico livestock producers, primarily by consuming standing forage that ranchers depend on to sustain their herds after bringing livestock off public lands. This includes harvested hay and forage production in grazing pastures. In addition, elk often consume and trample stored hay, compounding feed losses.

3.2 Changes in Feeding Practices

As a response to reduced forage availability, livestock producers often begin winter feeding earlier than planned. Because spring green-up and public land access dates re-

main unchanged, earlier feeding typically extends the total winter-feeding period.

Extended feeding periods increase total hay and supplemental feed use and require additional labor for feeding and livestock management. These management adjustments represent a secondary but measurable economic impact of elk use, reflected through higher feed and labor costs rather than additional forage loss.

3.3. Infrastructure wear and damage

Fences, gates, and corrals are often damaged as elk move across private lands to access forage and water. Large herd sizes, concentrated use near gates, and low visibility conditions increase the likelihood of broken wires, bent gates, and damaged corral panels. Although elk may contribute to acequia maintenance needs, these impacts are generally minor compared with forage and feed losses and are not a primary source of economic damage for most producers.

3.4. Labor and operational adjustments

Elk use of private lands increases labor demands and requires livestock operational adjustments. Because elk often move and feed during nighttime and early morning hours, producers must also spend more time monitoring fields and livestock to prevent damage and manage elk presence.

In addition, uneven forage removal by elk can disrupt planned grazing rotations, forcing producers to modify grazing plans, relocate livestock, or utilize alternative pastures. These adjustments require additional labor, time, and management effort, further increasing the indirect costs associated with elk use of private lands.

4. ECONOMIC VALUATION FRAMEWORK

Elk-related costs to livestock production are evaluated using a partial budgeting-based monetary impact framework that compares baseline conditions with and without elk. This approach is consistent with the partial budgeting methods described in the NMSU Cooperative Extension Service Guide Z-123.⁵ Forage losses are valued using local market prices for alfalfa and hay and applied to estimated reductions in yield or available feed. Damage to fences and other infrastructure is valued using documented replacement or repair costs.

Additional labor costs are estimated using prevailing agricultural wage rates for the region, based on USDA data.⁶ This framework focuses on measurable, verifiable costs and excludes indirect or non-market impacts.

5. USE OF ENTERPRISE BUDGETS AS A BASELINE FOR ECONOMIC VALUATION OF ELK-RELATED COSTS

New Mexico enterprise budgets were used to establish baseline production costs for alfalfa and livestock operations under conditions without wildlife impacts. These budgets provide standardized cost structures for feed, labor, machinery, and infrastructure that reflect typical management practices in the region.

Observed production conditions with elk use were compared against these baseline budgets to identify deviations attributable to elk-related impacts. This partial budgeting approach allows for consistent estimation of additional costs and reduced returns associated with forage loss, changes in feeding practices, infrastructure disturbance, and increased labor requirements. Applying a uniform budget framework across operations also reduces variability arising from inconsistent valuation methods, thereby improving comparability and transparency across economic assessments.

Direct impacts of elk on sprinkler-irrigated alfalfa production by comparing baseline conditions without elk to producer-reported conditions with elk on a per-acre basis is provided in Table 1. Baseline values are derived from the 2024 Rio Arriba County alfalfa enterprise budget,⁷ while “with elk” values reflect observed conditions reported by producers.

Elk impacts are concentrated in reduced forage availability and grazing valuation. Producers reported losing approximately one ton of alfalfa hay per acre, reducing hay revenue from \$525 to \$315 per acre. In addition, the availability of grazing pasture forage (aftermath) declined by approximately one AUM per acre, reducing grazing value from \$40 to \$20 per acre.

Elk activity also increases irrigation ditch and canal maintenance requirements due to trampling and bank disturbance, raising maintenance costs from \$8 to \$18 per acre. The additional \$10 per acre represents a conservative estimate of incremental labor and minor repair costs associated with repeated elk-related ditch disturbance over the irrigation season, capturing ongoing maintenance rather than a fixed number of discrete repair events.

Overall, the combined effect of reduced hay production and lost aftermath grazing results in an estimated direct loss of \$230 per acre in forage and grazing value. The percent changes shown in the final column of Table 1 are provided to allow producers and agencies to apply the valuation framework using operation-specific yields, prices, and costs rather than relying on fixed-dollar estimates from a single year. They are reported for individual cost and return components but not for total values, which represent net partial-budget effects combining reduced returns and increased costs.

When the livestock enterprise budget is used as a baseline, elk-related impacts are reflected entirely through increases in variable operating costs rather than changes in livestock production or asset values. Elk use of private lands reduces the availability of home-grown forage and aftermath grazing, resulting in earlier initiation and longer duration of winter feeding. These effects increase hay and supplemental feed use per cow and raise associated labor, equipment, and ranch maintenance costs. Livestock output, herd size, prices, and all ownership and capital costs remain unchanged and are held constant in valuation.

Table 1. Directly Impacted Alfalfa Production Budget: Without Elk vs. With Elk. Per acre, Rio Arriba County, 2024.

Item (Direct Impact Only)	Unit	Without Elk	With Elk (Producer-Reported)	Change Due to Elk (%)
Alfalfa hay yield	tons/acre	2.50	1.50	-1.00(-40)
Total hay revenue	\$/acre	\$525.00	\$315.00	-\$210.00(-40)
Grazing (aftermath)	AUM/acre	2.0	1.0	-1.0(-50)
Grazing value	\$/acre	\$40.00	\$20.00	-\$20.00(-50)
Canal/ditch maintenance	\$/acre	\$8.00	\$18.00	+\$10.00(125)
Total lost forage and grazing value	\$/acre	-	-	-\$230.00

Note: Without elk section is based on NMSU CES costs and returns estimates, 2024 (<https://costsandreturns.nmsu.edu>).

Elk-related forage losses were converted into increased recommended hay requirements by valuing lost private-land alfalfa production at prevailing market prices and allocating the resulting replacement cost across the breeding herd (Table 2).

This analysis does not directly estimate the quantity of forage consumed by elk. Instead, elk-related impacts are measured based on the additional hay required to maintain livestock feeding levels when forage availability on private lands is reduced.

Based on Series 1 enterprise budget assumptions, elk-related reductions in alfalfa yield and aftermath grazing across approximately 20 acres result in an estimated forage shortfall of about 20 tons annually. When valued at local market prices and allocated across a 30-cow herd, this translates to an increase of approximately \$145.67 per cow in required hay costs (refer to appendix A).

Elk presence increases labor and maintenance requirements through additional fence repair, pasture upkeep, and monitoring activities (Table 3). These impacts are reflected as incremental increases in ranch maintenance and operating costs, while the underlying cost structure of the livestock enterprise budget is held constant.

Table 2. Livestock Feed Cost Impact of Elk (Per Cow, 2024)				
Item	Unit	Without Elk (Baseline)	With Elk	Change Due to Elk (%)
Required hay	\$/cow	\$506.67	\$652.34	+\$145.67(29)
Protein supplement	\$/cow	\$114.33	\$114.33	+\$0.00
Salt & mineral	\$/cow	\$70.00	\$70.00	+\$0.00
Total feed cost	\$/cow	\$707.20	\$852.87	+\$145.67(21)
Note: Baseline values (“Without Elk”) are derived from the Series 1 livestock and alfalfa enterprise budgets developed for representative small cow–calf operations in the Northern Central Mountain Region of New Mexico (2024). Percent changes reflect proportional differences between baseline and observed conditions and are provided to allow producers and agencies to apply the partial budgeting framework using operation-specific yields, prices, and costs. Dollar values shown represent illustrative estimates for a representative year and should not be interpreted as fixed losses across all operations.				

Table 3. Livestock Labor and Maintenance Cost Impacts of Elk Per Cow, Northern Central Mountain Region, 2024				
Item	Unit	Without Elk (Baseline)	With Elk	Change Due to Elk(%)
Ranch maintenance	\$/cow	\$83.33	\$93.33	+\$10.00(12)
Operating costs – vehicle	\$/cow	\$51.50	\$56.50	+\$5.00(10)
Operating costs – equipment & machinery	\$/cow	\$26.95	\$31.95	+\$5.00(19)
Total labor & maintenance-related costs	\$/cow	\$161.78	\$181.78	+\$20.00(12)

Ranch maintenance costs are assumed to increase by \$300 per herd per year due to additional fence, gate, corral, pasture, and ditch repairs associated with elk activity. For a 30-cow herd, this corresponds to an incremental cost of \$10 per cow and represents a conservative estimate.

Additional labor and monitoring costs are captured through increased vehicle and equipment operating expenses. Elk presence increases nighttime and early-morning monitoring, travel to check fences and livestock, and feeding logistics. These impacts are represented by an additional \$300 per herd per year, or \$10 per cow, using existing operating cost categories.

Elk-related forage losses and operational disruptions in relation to increased livestock production costs are summarized in Table 4. Higher feed purchase requirements, additional labor, and maintenance expenses are indicative of why there were higher overall livestock production costs. All livestock production parameters and fixed ownership costs are held constant; therefore, the difference between baseline and “with elk” costs represents the direct economic impact of elk on livestock operations.

Table 4. Livestock Cost Impacts of Elk on Private Lands Per cow, Northern Central Mountain Region, 2024				
Cost Item (Direct Impact Only)	Unit	Without Elk (Baseline)	With Elk	Change Due to Elk (%)
Required hay	\$/cow	\$506.67	\$652.34	+\$145.67
Protein supplement	\$/cow	\$114.33	\$114.33	+\$0.00
Salt & mineral	\$/cow	\$70.00	\$70.00	+\$0.00
Total feed cost	\$/cow	\$707.20	\$852.87	+\$145.67(21)
Ranch maintenance	\$/cow	\$83.33	\$93.33	+\$10.00
Operating costs – vehicle	\$/cow	\$51.50	\$56.50	+\$5.00
Operating costs – equipment & machinery	\$/cow	\$26.95	\$31.95	+\$5.00
Total labor & maintenance costs	\$/cow	\$161.78	\$181.78	+\$20.00(12)
Total livestock cost	\$/cow	\$868.98	\$1,034.65	+\$165.67(19)

6. DOCUMENTATION CONSIDERATIONS FOR PRODUCERS

Accurate evaluation of elk-related impacts at the individual operation level requires consistent recordkeeping. Producers are encouraged to document:

- Feeding starts and end dates.
- Quantities and types of hay and supplemental feed used.
- Hay production records, including yields and acres harvested.
- Repair and maintenance receipts for fences, corrals, and irrigation infrastructure.
- Labor records associated with feeding, monitoring, and repairs.

Maintaining these records allows producers to quantify elk-related costs more accurately and apply the valuation framework presented in this guide to their own operations. Extension personnel can assist producers with recordkeeping and provide standardized tools and guidance to support consistent documentation across operations.

7. SUMMARY

Elk use of private lands can create measurable economic impacts on livestock producers in northern New Mexico mountain regions. These production systems are particularly sensitive to forage loss due to small herd sizes, limited private acreage, and reliance on homegrown hay and aftermath grazing for winter feeding.

This guide demonstrates how elk-related impacts can be evaluated using a consistent, transparent economic framework grounded in enterprise budgets and observable data. While the magnitude of impacts varies across operations, years, and site-specific conditions, the methods presented here allow producers and agencies to document costs in a comparable and defensible manner.

Economic valuation of elk-related costs supports clearer communication between producers, Extension personnel, and agencies, promotes consistent evaluation across operations, and improves shared understanding of how elk use of private lands affects livestock production systems.

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APPENDIX

Appendix A: Required Hay loss calculation from Table 2

Values used (from Series 1 and Table 1)

- Alfalfa yield loss = 1.0 ton per acre
- Affected alfalfa acreage = 20 acres (Series 1 enterprise description)
- Hay price = \$190 per ton (Series 1 livestock budget)
- Lost aftermath grazing value = \$400 total (1 AUM/acre × 20 acres × \$20/AUM)
- Number of cows = 30

Calculation

Step 1. Lost alfalfa production value:
 $1.0'' \text{ ton/acre} \times 20'' \text{ acres} \times \$190 = \$3,800$

Step 2. Lost aftermath grazing value:
 $1.0'' \text{ AUM/acre} \times 20'' \text{ acres} \times \$20 = \$400$

Step 3. Total forage replacement value:
 $\$3,800 + \$400 = \$4,200$

Step 4. Allocate across herd:
 $\$4,200 \div 30'' \text{ cows} = \$140.00'' \text{ per cow}''$

Step 5. Conservative adjustment for waste, trampling, and feeding inefficiencies:
 $\$140.00 \times 1.04 \approx \$145.67'' \text{ per cow}''$



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