PRIVATE COSTS OF PREDATOR CONTROL IN NEW MEXICO IN 1983

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ABSTRACT: A survey was conducted by the New Mexico Department of Agriculture in early 1984 to determine costs incurred by livestock producers to control predation on livestock during 1983. Out of a sample of 1,848 producers who were sent questionnaires, 706 (38%) usable responses were returned. The respondents reported having about 30% of the peak number of sheep and lambs and 19% of the peak number of range beef cattle and calves, respectively, estimated to have been in New Mexico in 1983. Total cost reported by 306 respondents who had costs, not including donations to the New Mexico cooperative Animal Damage Control program, was about $450,000. Trapping (including the use of traps, snares, and M-44 devices) accounted for 38%, coyote drives 15%, "other nonlethal" methods 14% (including predator-resistant fences, night penning, shed lambing, etc.), and aerial gunning 12% of total cost. Sight or trail dogs accounted for 5%, ground shooting 1%, guard dogs 5%, sheepherders 7%, and miscellaneous costs (generally included labor and vehicle or horse expenses to check for predator sign and kills) 2% of total reported costs. Lethal methods comprised 72% and nonlethal methods 26% of the total cost. Sixty-seven percent of the sheep producers who had costs for predator control reported spending money on one or more nonlethal methods; of these, 29% spent money on guard dogs, 22% on herders, and 52% on "other nonlethal" methods. A generalized approximation of the total costs incurred by livestock producers in New Mexico in 1983, based on the survey results plus private contributions to the New Mexico cooperative Animal Damage Control program, was $1.8 million. Adding this estimate to the total estimated value of sheep and cattle lost to predation brought the total economic impact of predation on the livestock industry in New Mexico in 1983 to $5.3 million. The data suggested private predator control costs are approximately one-third of the economic impact of predation on livestock producers.

INTRODUCTION

Predation causes considerable losses of livestock in New Mexico. The U.S. Department of Agriculture, Statistical Reporting Service (USDA-SRS) and the New Mexico Department of Agriculture (NMDA)* estimated that losses of sheep and lambs to predators in 1983 totaled 52,900 head, valued at about $2.2 million. A special survey conducted in early 1984 by the USDA-SRS/NMDA estimated cattle and calf losses to predation in 1983 totaled 4,400 head at a value of about $1.3 million.

Value of animals lost to predation, however, does not provide a total picture of the impact of predation on the livestock industry. Many livestock producers spend considerable amounts of money to control or prevent damage by predators.

The New Mexico ADC Advisory Committee, appointed in 1983 by Dr. William P. Stephens, director/secretary of agriculture for the State of New Mexico, identified the need to determine the private expenses of ranchers for predator control exclusive of money contributed to the New Mexico cooperative Animal Damage Control (ADC) program.** The New Mexico Wool Growers, Inc., also identified this need. Both groups requested the NMDA to conduct a survey to obtain this information. Determining the amount of private expenses for predator control would add to the total picture of the impact of predation on the livestock industry and could perhaps be used to convince legislators of the need for additional funding for ADC in New Mexico. Therefore, in early 1984, the NMDA conducted a special survey to estimate private predator control costs in New Mexico during 1983. This paper reports the results of that survey.

METHODS

A sample one-page questionnaire was designed and pretested by having 25 ranchers complete the questionnaire at meetings of the New Mexico Cattle Growers' Association and the New Mexico Wool Growers', Inc., in December 1983. The questionnaire asked for each respondent's best estimate of the total cost for controlling or preventing damage to his livestock by predators in 1983. The respondent was then asked to break down his cost by a number of categories, including lethal and nonlethal control methods. Respondents were asked specifically not to include any money they contributed to the cooperative ADC program. The questionnaire also asked for the respondent's peak number of sheep and cattle in 1983.

The USDA-SRS/NMDA selected the sample of livestock producers for the survey and assisted in questionnaire design. Questionnaires were sent to a stratified random sample of 1,948 livestock producers in early April 1984. Three weeks later, a second mailing was conducted requesting information from all producers who had not responded.

*These two agencies cooperate to form the New Mexico Crop and Livestock Reporting Service.

**A cooperative program between the U.S. Fish and Wildlife Service (USFWS) and NMDA.

RESULTS

Discussions with the 25 ranchers who responded to the questionnaire during the pretest indicated most were conservative in their estimates of cost. When asked about certain categories of cost, such as their labor in checking traps, extra time in checking livestock due to the fear of predation, or other indirect costs, such as additional veterinary and feed costs associated with unusual confinement for protection against predators, most admitted they either had not thought of those costs or did not know how to quantify them. Also, when stating the costs they were able to quantify, most indicated their estimates were conservative (e.g., several were only willing to quantify fuel costs in attempting to estimate vehicle expenses for checking predator control equipment). For these reasons, it was assumed the questionnaire would provide a conservative estimate of most livestock producers' predator control costs.

Of the 1,948 questionnaires sent in the first mailing, 9 were returned by the post office as undeliverable and 371 responses were returned. Twenty of the 371 respondents reported they had no livestock. A total of 1,568 second request questionnaires were sent to those not responding to the first mailing.

A total of 462 responded to the second mailing, of which 71 reported having no livestock. Subtracting the total of the unusable responses (i.e., 91 that had no livestock plus 9 undeliverable questionnaires) from the original sample left a sample of 1,848 livestock producers in the survey. A total of 742 responses were received in the two mailings, for a total response rate of 40%. Thirty-six of the 742 respondents indicated they had predator control costs but were unable to estimate them; subtracting these from the 742 responses left 706 questionnaires for a usable response rate of 38%.

The peak number of sheep and lambs reportedly held by the 706 respondents in 1983 was 292,797; the peak number of cattle and calves was 332,183. These numbers represent approximately 30% of the sheep and lambs and 19% of the range beef cattle and calves (i.e., all cattle except dairy cattle and those in feedlots), in New Mexico in 1983.[1/]

Predator control costs reported by the 706 respondents totaled $449,252. Four hundred, or 57%, reported spending no money on predator control; 306, or 43%, had predator control expenses. The mean expense for those reporting expenses was $1,468, with a range of $10 to $25,600 and a standard deviation of $2,755. The broad range and high standard deviation indicate predator control costs are highly variable among livestock producers.

Costs by Method of Control

Table 1 shows a breakdown of expenditures by method, as reported by the 306 respondents who had quantifiable costs. Trapping, which included the use of steel traps, snares, and M-44 devices, was the largest single category of expense. It accounted for approximately 38% of the total cost and was reported by 191 (62%) of the 306 respondents who had quantifiable costs.

Coyote drives (moving a number of vehicles, motorcycles, horses, etc., through an area to force coyotes into moving so they can be seen and shot) accounted for about 15% of total reported costs. Expenditures in this category were reported by 102 (33%) of the respondents who had quantifiable costs. "Other nonlethal" methods (includes methods such as predator-resistant fences, night penning, shed lambing, repellents, frightening devices, etc.) were reported by 104 (34%) of the respondents who had costs for predator control and accounted for 14% of total reported costs. Aerial-gunning (shooting from a fixed-wing airplane or helicopter) expenses were reported by only 8% of the respondents who had costs, but accounted for 12% of the total reported costs in the survey.

Lethal methods accounted for 72% of total reported costs in the survey. Nonlethal methods of control (includes guard dogs, sheepherders, predator-resistant fences, night penning, and shed lambing) accounted for 26% of total costs. Miscellaneous costs, which generally included labor and vehicle or horse expenses to check for predator sign and kills, comprised 2% of total costs.

[1/] The peak number of sheep and lambs in New Mexico in 1983 was 960,000; the peak number of range beef cattle and calves in that year was 1,782,000. These estimates assume inshipments and outshipments were approximately equal at the time peak livestock numbers were reached in 1983 and discounts slaughter reductions. Data are from the USDA-SRS/NMDA.

Table 1. Summary of predator control cost data by method from results of a survey to determine private costs of predator control in New Mexico in 1983.

Method	Number of respondents reporting costs[1/]	Reported cost	% of total costs	Mean per respondent[2/]	Range
All methods combined	306	$449,252	100	$1,468	$10-25,600
Trapping[3/]	191	$172,749	38.4	904	$10-18,000
Aerial Gunning	26	53,622	11.9	2,062	100-11,400
Coyote Drives	102	69,503	15.5	681	10-10,000
Sight or Trail Dogs	34	21,530	4.8	633	25- 4,000
Ground Shooting	37	5,755	1.3	156	35- 3,600
Guard Dogs	54	21,625	4.8	400	35- 3,600
Sheepherders	41	32,830	7.3	801	20- 5,000
Other Nonlethal[4/]	104	62,826	14.0	604	10- 5,000
Miscellaneous[5/]	17	8,812	2.0	518	25- 2,250

1/ Many respondents reported costs for more than one method.

2/ This mean is for those respondents who reported costs for the particular method in the same line of this table.

3/ Includes use of traps, snares, M-44 devices.

4/ Includes nonlethal controls such as predator-resistant fences, night penning, shed lambing, etc.

5/ Includes labor and vehicle expense to check for predator sign and kills.

Table 2 shows the number of sheep producers who reported costs for predator control and the number spending money on various nonlethal methods of control. Sixty-seven percent of the sheep producers who had predator control costs spent money on one or more nonlethal methods; 29% spent money on guard dogs, 22% spent money on herders, and 52% spent money on other nonlethal means (includes nonlethal controls such as predator-resistant fences, night penning, shed lambing).

Table 2. Numbers and percentages of sheep producers who had costs for predator control that spent money on nonlethal methods. Data are from a survey to determine private costs of predator control in New Mexico in 1983.

Respondents	Number	Percentage of total
Number of respondents with sheep who had expenses for predator control	188	100%
Number reporting expenses for any combination of nonlethal means	126	67%
Number reporting expenses for:		
Guard dogs	54	29%
Herders	41	22%
Other nonlethal means[1/]	97	52%

1/ Includes predator-resistant fences, night penning, shed lambing, etc.

Calculation of a Statewide Estimate of Costs

It is realistic to assume that the $449,252 reported by respondents in this survey is only a portion of the total dollars spent by private individuals for predator control in New Mexico in 1983. Statewide costs are probably several times greater since the survey only reached operators of about one-third of the sheep and one-fifth of the cattle in the state. Expansion to a statewide estimate based on mean expenses per rancher was hampered by the fact that 79% of the sheep and 18% of the cattle in the survey were held by producers who had both classes of livestock. Expansion by mean cost would have required separating respondents into strata by size of operation. Also, for respondents having both classes of livestock, it was not possible to separate sheep-associated costs from those associated with cattle. This confounding effect made expansion by mean cost impractical.

For these reasons, a precise statewide estimate of costs was not possible based on these survey results. However, we calculated a "best estimate" based on expansion by numbers of livestock. Such an estimate required estimating the proportion of livestock in the state for which predator control costs were incurred as well as the per-head-cost for predator control.

To do this, three categories of livestock producers were identified in the survey: (1) those with sheep only, (2) those with cattle only, and (3) those with both sheep and cattle. The proportions of sheep and cattle that fell into each of these categories on a statewide basis were assumed to be equal to the proportions in the survey results. For each of these categories, two factors were calculated: (1) the proportion of sheep or cattle, as the case may be, for which predator control costs are incurred, and (2) the cost per head. Those calculations are shown in Table 3. The statewide estimate was calculated using information from Table 3 and is presented in Table 4. Using the survey data, private predator control costs in New Mexico in 1983 were approximately $1.75 million. Private contributions to the New Mexico cooperative ADC program in federal fiscal year 1983 totaled approximately $56,000 (USFWS 1983). Adding these figures brought the total estimated private costs for predator control to about $1.8 million in 1983.

Table 3. Determination of the proportion of animals (sheep or cattle) for which predator control costs were incurred and the cost per head for three categories of livestock producers using data from a survey to determine private predator control costs in New Mexico in 1983.

	Category of livestock producer[1]			
		Sheep and Cattle		
	Sheep only	Sheep	Cattle	Cattle only
Number of animals in category from survey results[2]	61,541	231,256	61,814	270,369
Number with costs associated	58,462	213,313	40,432	85,281
Proportion with costs associated	.95	.92	.65	.32
Predator control cost	$56,019	$309,847		$ 83,386
Cost per head (for animals with costs)	$ .96	$ 1.22[3]		$ .98

[1] Each category refers to the type of livestock held; i.e., "sheep only" refers to producers who had sheep but no cattle; "sheep and cattle" refers to those who had both sheep and cattle; "cattle only" refers to producers who had cattle but no sheep.

[2] These numbers are peak numbers of sheep and lambs or cattle and calves held by producers in each category during 1983.

[3] Calculated by dividing $309,847 by the sums of 213,313 and 40,432.

Table 4. Calculation of a statewide estimate of private predator control costs in New Mexico in 1983 using survey data.

	Category of livestock producer[1]			
		Sheep and cattle		
	Sheep only	Sheep	Cattle	Cattle only
Number of animals in category statewide[2]	201,776	758,224	331,602	1,450,398
Proportion with predator control costs[3]	.95	.92	.65	.32
Cost per head for those with costs associated[4]	$ .96	$1.22	$1.22	$ .98
Estimated cost statewide	$184,020	$851,031	$262,960	$454,845
			Total Cost	$1,752,856

[1] Each category refers to the type of livestock held; i.e., "sheep only" refers to producers who had sheep but no cattle; "sheep and cattle" refers to those who had both sheep and cattle; "cattle only" refers to producers who had cattle but no sheep.

[2] Assumes proportion of animals in each category on a statewide basis in 1983 was equal to proportion in each category in the survey results. Each number is a portion of the peak number of sheep and lambs or cattle and calves estimated to have been in New Mexico during 1983.

[3] From Table 3.

[4] From Table 3.

DISCUSSION

Based on this survey, it appears livestock producers in New Mexico spend the greatest sums of money on lethal means of predator control (72% of total cost). However, the survey indicated nonlethal means of control are not ignored. Forty-three percent of the respondents who had costs for predator control in this survey reported spending money on nonlethal means. Of sheep producers who had costs, 67% spent money on nonlethal methods of control. Therefore, it appears nonlethal methods are an important part of livestock producers' efforts to control predation problems in New Mexico.

A reason for the relatively low percentage of total expenditures reportedly spent on nonlethal means is that some nonlethal means of control, such as guard dogs and sheepherders, are less likely to be effective in large fenced rangeland pastures commonly used for sheep production in the eastern part of New Mexico. Ranchers in these areas generally allow sheep to scatter in the pastures rather than being close herded. Perhaps this is because close herding, a requirement for the use of guard dogs and sheepherders, can cause reduced animal performance, deterioration of the range resource and subsequent soil erosion (Bowns 1982). Close herding is generally a management practice restricted to producers of large numbers of sheep grazed on unfenced ranges (USFWS 1978).

It was not possible to determine the proportions of expenditures in the various categories of "other nonlethal" methods for which expenses were incurred by respondents. However, it is believed that a majority of the money spent in this category was for predator-resistant fencing. Most rangeland used for sheep production in New Mexico is enclosed with net wire fences that have several strands of barbed-wire at the top. Ninety-three percent of the respondents who reported expenses in the "other nonlethal" methods category were sheep producers. Although these fences are primarily intended to hold sheep and lambs, a secondary benefit is the deterrence of coyotes and other predators. Net wire fences, particularly with aprons attached at the bottom, deter most coyotes from passage. Some coyotes learn to jump net wire fences. Those that find ways through or under such fences are more easily captured since they tend to cross at identifiable locations which makes it easier to trap them. This is similar in concept to the "directing fence" described by DeLorenzo (1977). Therefore, predator-resistant fences are usually utilized in combination with lethal means of control on the rangeland sheep producing areas of New Mexico.

Indian reservations were not included in the sample of livestock producers for this survey, yet they account for a significant percentage of the stock sheep in New Mexico. Federal confidentiality laws prevent disclosure of agricultural statistics that can be identified with single entities (USDA-SRS, pers. comm. 1983). As a result, we were unable to exclude Indian reservations from statewide livestock inventory data used to calculate the estimate of statewide private predator control costs. Therefore, an implicit assumption of our estimate is that predator control costs associated with livestock produced on Indian reservations are similar to costs outside of reservations.

The statewide estimate of cost calculated from the survey results must be viewed with caution due to the high variability in cost among livestock producers who responded in the survey. The estimate assumes the survey results were representative of the sheep and cattle producers in New Mexico in 1983. However, the low response rate (38%) of this survey suggests nonresponse biases (Filion 1978) could have been present. Budget limitations prevented adequate followup contacts with nonrespondents to determine if such biases occurred.

The statewide cost estimate also assumes that ranchers reported their costs accurately. Although their estimates were probably honest, they may not have been accurate, since most ranchers did not have records but reported instead from memory. However, since interviews with livestock producers who participated in the pretest suggested most estimates provided on completed questionnaires would be conservative, it is probable the individual cost basis for calculating the statewide estimate was also conservative. Therefore, if an upward bias associated with nonresponse was present, it may have been countered to a degree by the conservative nature of individual responses.

The data from this survey indicate private costs for predator control, exclusive of contributions to the cooperative ADC program, are a significant portion of the overall cost of predation to the livestock industry in New Mexico. The value of cattle and sheep lost to predators in New Mexico in 1983 was estimated to be $3.5 million. Adding our estimate of private expenses for predator control ($1.8 million) brings the total economic impact of predation on livestock producers, excluding contributions to the cooperative ADC program, to approximately $5.3 million. If 1983 was a representative year, the data from the survey suggest private predator control costs are approximately one-third of the economic cost of predation to livestock producers in New Mexico.

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