

Circumstances Associated with Predation Rates on Sheep and Goats

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Abstract

Factors possibly associated with high (over 5%) and low (0–5%) predation intensities were compared among 95 sheep or goat producers in 5 states to determine if important differences were evident between the 2 groups. Data were compared for the following variables: losses to predation, flock size, type of ranch operation, management practices, predator indices, prey indices, use of U.S. Animal Damage Control program, private control efforts, predation history, timing of predation, and presence of other sheep or goats nearby. Overall, 45% of the producers reported over 5% predation losses of their lambs or kids and predation percentages tended to increase with decreased flock sizes. Feeder lamb and range sheep operations had predominantly low predation loss percentages, but most operations that included goats reported over 5% predation losses due to goat predation. A variety of management practices were used by both groups; however, low loss producers indicated low natural prey and predator populations. Most of the producers used the federal ADC program and some type of private control effort, although more high loss producers used both types. Rough, bottom, and brush grazing lands, historic predation problems, and high predator indices characterized many of the high loss producers.

Predation intensity on livestock among producers is variable (Gee et al. 1977, Nass 1980). Various studies (deCalesta 1978, Schaefer et al. 1981, and others) have shown that livestock losses to predators vary significantly among samples of producers; however, data on reasons for this variability are lacking (Gee et al. 1977). Frequently, experienced animal damage control personnel know or suspect why specific levels of predation are occurring at specific times, but there have been no standardized mechanisms for recording, tabulating, and comparing the information on a ranch-by-ranch basis. Boggess et al. 1980, Meduna 1977, and Schaefer et al. 1981 have explored the effects of some husbandry practices on livestock predation levels.

The objective of our study was to identify factors common to ranches with high sheep or goat predation and compare them with low predation loss ranches.

Methods

Sheep producers in 5 states: California, Idaho, North Dakota, Oregon, and Texas were interviewed to obtain data on their 1979–1980 sheep or goat operations. Producer names were provided by state sheep associations, county agents, and U.S. Fish and Wildlife Service animal damage control (ADC) district supervisors. Information was collected from 95 sheep or goat producers selected from a total listing of about 300 producers. The list did not include all producers in each state. The sample was selected to include a variety of sheep operations through consultations with people knowledgeable about the sheep and goat industries in each state.

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Data were collected on the following features:

Losses to predation	U.S. Animal Damage Control participation
Flock size	Private animal damage control
Type ranch operation	Habitat
Husbandry practices	Predation history
Predator index	Timing of predation
Natural prey index	Other flocks nearby

General habitat types were determined by observation. Predator and natural prey indices were rated on a 1 to 3 scale indicating low, moderate, and high densities by the producers, sheep foremen, or in some instances, the district field assistants, depending upon familiarity with the specific areas involved.

Because of the large Texas goat industry, 7 of 12 producers from that sample raised goats, either alone or in conjunction with sheep, cattle, or both. The producers were assigned to a low predation loss category (0–5%) or a high predation loss category (over 5%). This division was used for convenience in making comparisons; from the producers' viewpoint, losses of less than 5% may be considered excessive and have an adverse economic impact upon their operations.

Results

Overall, 43 (45%) of the producers incurred over 5% loss of lambs or kids to predators; 38 (40%) reported over 5% predation losses when adults were included (Table 1). The percentages of lamb/kid predation were loosely correlated with flock size ($r = -0.22$, $P.05 = 0.205$). Although there was extreme variation with the sample, percentages of lambs/kids lost to predation tended to

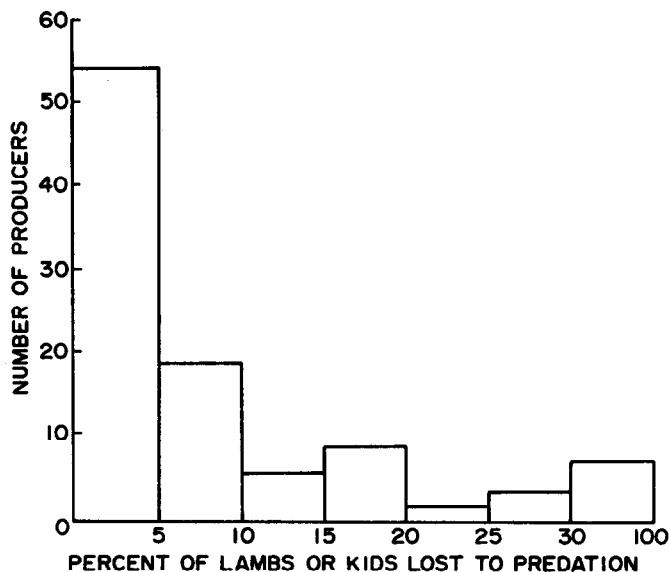


Fig. 1. Intensity of predation on lambs or kids by numbers of producers

Table 1. Percent of ranchers, by state, with high (over 5%) or low (0-5%) reported predation losses.

State	Number of ranches (n)	Percent of ranches at each predation rate			
		Predation on lamb/kids		Total sheep/goat predation	
		Low	High	Low	High
OR	35	57	43	54	46
ID	20	50	50	65	35
ND	13	23	77	38	62
TX	12	33	67	42	58
CA	15	100	0	100	0
Overall	95	55	45	60	40

Table 2. Mean flock or herd size at five levels of predation intensity (no. of producers in parens).

State	None	Levels of reported predation on lambs and kids			
		0>5%	5>10%	10>15%	15>100%
OR	389 (10)	3146 (10)	412 (4)	265 (1)	330 (10)
TX	—	912 (4)	553 (3)	—	494 (5)
ND	435 (2)	1530 (1)	670 (5)	813 (2)	378 (3)
ID	585 (2) ^a	698 (7)	761 (6)	679 (2)	404 (2)
CA	5591 (6)	4561 (9)	—	—	—
Overall \bar{X}	1750 (20)	2169 (31)	599 (18)	586 (5)	401 (20)

^aOne flock with no lambs excluded.

increase as flock size decreased. Twenty producers did not suffer predation losses whereas 20 lost over 15% of their lambs/kids to predation (Table 2). The predation loss distribution by numbers of producers is shown in Figure 1.

The feeder type operations in Oregon and some California producers had large flocks of sheep, thereby increasing mean flock sizes for those states. The mean number of sheep or goats per low-loss producer was 1,875, but this dropped to 703 when the California sample was excluded. The mean number of animals for high-loss producers remained at 560 with and without the California producers.

The types of farm or ranch operations fit seven general categories (Table 3). Forty-four percent of the sheep producers had farm

operations lost over 5% of the lambs to predation. Sheep, sheep-cattle, and range flock operations, constituting 43% of the sample, generally had less than 5% loss to predators.

Sheep management (husbandry practices) techniques were arbitrarily separated from use of control methods, although some could appear in either or both lists. For example, the use of electric fencing to exclude coyotes might be considered either a control method or a management practice, as could the use of guard dogs, woven wire fences, and others. The husbandry practices list includes items for which information was available, but does not necessarily include every possible management practice used by every producer (Table 4). Rotation of pastures, use of two herders, and night lighting are examples of practices for which information was not obtained.

Among the 95 producers, use of woven wire fencing (100%), shed lambing (79%), and daily sheep checking (66%) were the most frequently used management practices. Range flock producers used woven wire fences on home ranches, but of course did not use woven wire on open ranges. Producers using these three husbandry techniques were about equally divided between high and low predation on lambs or kids with over 5% losses incurred by 45% of those with woven wire fences, by 47% that shed lambled, and by 46% who checked their sheep daily. Keeping sheep close to buildings at night, penning at night, and using herders were the next most prevalent management techniques noted. Most producers who penned sheep at night and used herders had low losses to predators. Thirty-nine producers (41%) were using one or more of these techniques in their sheep or goat management. Keeping sheep close to buildings at night and penning at night were used for smaller farm flocks, whereas herders were used with larger flocks in fenced pastures or on open range. Other practices, such as confinement of lambs, bells on sheep, and predator proof electric fencing were reported infrequently.

Producers' impressions of predator and natural prey abundance showed lower indices for both prey (2.1) and predators (2.2) from those ranches with low predation rates. Reports of higher natural prey (2.3) and predator (2.6) indices came from high-predation-

Table 3. Percentages of 95 producers by type of operation and predation intensity.

Type operation	Percent of producers with lamb or kid predation rates		Percent of producers
	0-5%	over 5%	
Farm flock	45	55	44
Sheep-cattle	61	39	19
Sheep	65	35	18
Sheep-cattle-goat	29	71	7
Range flock	83	17	6
Feeder lamb	100	0	3
Goat-cattle	50	50	2

flocks that usually contained less than 300 sheep. Most combined raising sheep with other types of farming or ranching, such as growing of row or forage crops. A majority, 55% of these producers lost over 5% of their lambs or kids to predation. Although the sample is small, most producers (71%) with sheep, cattle, and goats lost over 5% of their lambs or kids to predation. No feeder lamb

Table 4. Use of some management techniques among 95 producers in relation to predation rates.

Management technique	Lamb/kid predation class				Total producer use (%)
	0-5%		>5%		
	No. producers	%	No. producers	%	
Use of woven wire fences	52	55	43	45	100
Use shed lambing	40	53	35	47	79
Check sheep daily	34	54	29	46	66
Keep sheep close to barn at night	9	47	10	53	20
Pen at night	8	73	3	27	12
Use herders	8	89	1	11	9
Confine lambs	2	67	1	33	3
Use bells on sheep	3	100	0	0	3
Use goats with sheep	1	50	1	50	2
Move sheep after predation	1	100	0	0	1
Use predator electric fence	0	0	1	100	1
Reduce sheep numbers	1	100	0	0	1

loss ranches. Mean indices for all ranches were 2.2 for prey species and 2.4 for predators.

Most producers used some type of animal damage control (Table 5), either private (self or contract) or through the U.S. Fish and Wildlife Service Animal Damage Control program. Only three producers did not use any program or methods for depredation reduction. Among low loss producers, 88% used the federal program and 67% carried out private control of some type. The federal program was used by 98% of the higher loss producers and 93% of these added private control efforts of some type.

Shooting coyotes was the most common form of private control work done by all producers (60%). This included attempts to shoot coyotes, calling or actively looking for coyotes, and incidental shooting when coyotes or dogs were observed during routine ranching activities. Personal trapping (11%), hiring trappers (5%), and hiring helicopters for aerial gunning (5%) were the next three popular forms of private control (Table 5). Use of guard dogs, hunting with snowmobiles, and shooting dogs were each reported by 3% of the producers. Producers with high predation losses used more methods and were more active in using private control efforts than were the producers with low losses.

Areas that are unsuitable for other purposes are frequently used for grazing sheep and goats. This is reflected in our sample where 46 (48%) of the producers used a combination of rough, bottom, and brush lands for their sheep or goats. Another 13 (14%) had similar areas adjacent to or near their ranches. Nine (21%) high-loss producers, but only 4 (8%) low-loss producers, had rough terrain and bottom areas adjacent to or near their grazing areas. Combinations of brush, timber, and grass or brush, and pasture

made up grazing areas for 21 (22%) of the producers and included 12 (23%) of the low loss producers and 9 (19%) of the high loss producers. Open type (mainly grass) pastures were utilized by 12 (23%) and 3 (7%) of the low- and high-loss producers, respectively. When only considering those 19 producers with no predation of lambs, 7 (37%) used open type, mainly grass, pastures, 9 (47%) used pastures with predominant brush or timber, and 3 (16%) used rough, bottom, and brush land. Two of these last three producers raised their lambs in confinement because of historic heavy predation, but they did allow ewes to graze the rugged pastures.

Predation history assessment by producers tended to follow current predation loss problems. Some low-loss producers assessed historical predation as high (56%), and others as low (24%). Eighty-four percent with high losses indicated predation was high historically, and only 2% had minor predation losses previously. Other producers cited yearly fluctuations in predation, extenuating circumstances related to predation, or varying predation rates related to yearly control efforts.

Most predation for low loss producers (45%) occurred during March, April, and May; however, 31% indicated predation could occur any time while the sheep or goats were grazing. Higher-loss producers also said losses could occur any time while animals were grazing (28%), but their high-loss months were April, May, and June (37%). Overall, 46% of the sample indicated that March through June were the months when predation could be severe.

Only 5 of 95 producers raised sheep or goats in isolation from other flocks or herds; therefore, the sample size was too small for speculation on the importance of this factor.

Table 5. Use of private predation control methods by 95 sheep/goat producers in relation to predation rates.

Control method	Lamb/kid predation class				Total producer use (%)
	0-5%		>5%		
	No. producers	%	No. producers	%	
Shoot coyotes	24	25	33	35	60
Trap coyotes	4	4	6	6	11
Hire trapper	3	3	2	2	5
Hire helicopter	3	3	2	2	5
Use guard dogs	1	1	2	2	3
Hunt with snowmobile	1	1	2	2	3
Shoot dogs	3	3	0	0	3
Use hounds	0	0	2	2	2
Pay bounty	0	0	1	1	1
Use poison	0	0	1	1	1
Use no private control	17	18	3	3	21

Discussion

The distribution of losses to predation in our sample is similar to those shown by Boggess et al. 1978, Dorrance and Roy 1976, Schaefer et al. 1981, and others. The tendency of producers with fewer animals to lose greater percentages of their sheep or goats than those with larger flocks might indicate that substantial differences occur in predator control policies between small and large operations. This does not appear to be true for the various features possibly affecting predation that were examined in our study, even though modes of operation generally differed with flock size. Overall, private control efforts, federal control efforts, general managerial practices, and other factors were similar between the large and small operations.

Range flock and feeder lamb operations had low predation loss percentages; however, some still reported large losses to predators. Feeder lamb producers usually restrain their flocks in confinement or semiconfinement and have close control over their flocks; both types of production are suited to large flocks. Ranches that included goats and farm flocks had higher predation loss percentages than did other types of operations. Goats are frequently raised in isolated pastures and are subject to severe predation in the brush areas of Texas (Wade 1982). Because farm flocks have modest numbers of animals, one or a few incidences of severe predation may result in substantial impact upon these producers. Even though loss percentages were low, most producers with predation problems and large flocks lost more animals to predation than did those with smaller flocks.

The four most widely used husbandry techniques were practiced about equally by producers with high and low predation losses. Penning at night and using herders were associated with low loss percentages; however, only 12% and 9%, respectively, of the total sample utilized these techniques. Davenport et al. (1973) found that Utah sheep producers using herders might have significant predation losses, but those losses were lower than for producers who did not use herders. Predation, in our sample, did not seem to be directly related to specific husbandry techniques. Husbandry practices are most efficient when used in conjunction with lethal control methods and their usefulness may be related to effort expended on such methods.

Most high-loss producers used the federal animal damage control program, utilized some form of private control, and indicated that predator and natural prey populations were relatively dense.

Persistent predation problems tend to generate increased efforts for predation reduction; therefore, it is not surprising that high-loss producers made extensive use of the federal animal damage control program. A similar situation existed for private control method efforts; increased predation resulted in the use of more methods in attempts to stop or reduce predation losses. Private control efforts were not used by 17 of the low loss producers, presumably because their predation problems or lack of them did not warrant the expense. Predator and prey index assessments indicated more coyotes or coyote signs and natural prey species or signs were seen on ranches with higher predation levels. This index was not precise, reflecting only general observations; thus, ranchers

with high losses may have only assumed that coyotes were abundant. A pair or two of coyotes can kill many lambs or kids, especially when litter energy demands are high (Till and Knowlton 1982), thus giving an impression of numerous coyotes present.

High-loss producers grazed animals in rough, bottom, or brush areas, or had these types close by (72%) in more instances than did low loss producers (53%). Generally, predation losses tended to be low for open, grassy, grazing areas. Frequently, habitats with dense vegetation and broken landscape contain large numbers of prey species, thus hold greater numbers of predators than do open areas. Control efforts may also be hampered by dense vegetation and rough terrain by restricting foot, horse or vehicular access and limiting the efficiency of aerial shooting. Historically, predation on many ranches varied from year to year, but higher predation losses were reported on ranches with a high-predation-loss history.

Most predation occurred in spring when lambs or kids were available in large numbers and when predators are typically provisioning young. Younger animals are most susceptible to predation; frequently the remains of small carcasses are not easily detected, therefore the predation of young animals may be difficult to detect and remedy.

Suitable terrain for predators, historic loss patterns, and higher predator indices tended to be associated with increased percentages of lambs or kids lost to predation. Surely, a combination of other factors is also involved: for example, the management practices and control efforts on adjacent ranches, the quality of husbandry and depredation control, and the relative abundance of resident coyotes.

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