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THE IMPACT OF COYOTE PREDATION ON THE SHEEP INDUSTRY IN SOUTHERN IOWA

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Cooperators: Iowa State Conservation Commission and Agricultural Experiment Station

Coyote depredation on sheep has long been considered a phenomenon unique to the western ranch states. However, recent evidence has suggested that this is also becoming a problem in the mid-western farm states. In the past decade and a half the Iowa coyote population, as well as the incidence of reports of livestock losses due to coyote predation, has increased greatly (Andrews, unpublished data, coyote harvest and bounty reports, Iowa Conservation Commission; Boggess 1975). Concurrent with this, the economic and recreational values of this mammal to hunters and trappers has also increased (Andrews, unpublished data, coyote harvest and bounty reports, Iowa Conservation Commission). The coyote currently has the status of a big game animal in Iowa, without any restriction on season or bag limit. Before implementing a species management plan that is in the best interests of livestock raisers, hunters, trappers and the people of Iowa in general, several aspects of coyote ecology must be considered. Previous studies in Iowa produced information on population structure, volume and occurrence of food contents in stomachs and scats, movements and mortality, and applicability of coyote population index methods in Iowa (Mathwig 1973, Boggess 1975).

Boggess (1975) also collected data on livestock losses from reports filed by individuals who were experiencing losses and found that since 1970, claims of alleged sheep losses caused by dog predation have decreased at about

the same rate that losses due to coyote predation have increased. This suggests that the coyote may be getting blamed for some of the losses that are actually caused by dogs. On a nation-wide perspective, Denny (1974) speculated that there is a probability that some of the predation by dogs may be attributed to coyotes.

Several researchers have recently verified livestock losses in some of the western states by field necropsy of carcasses (Bowns et al 1973, Henne 1975, DeLorenzo and Howard 1976, Klebenow and McAdoo 1976). However, no field investigations have been conducted in any of the farm states where livestock husbandry practices, habitat, densities of dogs and coyotes, and predator control methods are quite different from those in the west.

#### OBJECTIVES

1. Enumerate sheep losses to coyotes, dogs, and other causes.
2. Evaluate plausible influences of various husbandry practices and habitat on sheep losses to coyotes.
3. Evaluate current methods of predator control.
4. Determine the economic impact of the coyote in southern Iowa.

#### STUDY AREA

Davis County, the western one-third of Van Buren county and peripheral areas were chosen as a study area because of the coexistence of relatively high densities of coyotes and high concentration of sheep producers (Figure 1). In this 700 square mile area there are about 1,500 farms of which approximately 300 raise 31,000 sheep. About 44 percent of the land use is devoted to crop production and 48 percent to pasture (Iowa Assessors Annual Farm Census 1975). The predominant cover type for the remaining area is timbered ditches and uplands.



## METHODS

### 1. Enumerate sheep losses to coyotes, dogs, and other causes.

Four sources of information will be used to enumerate sheep losses:

- a. Questionnaire: A questionnaire will be sent to sheep producers in order to obtain information on alleged livestock losses and husbandry practices for 1975. See Appendix A.
  - b. Domestic Animal Claims: Domestic animal claims filed in Davis and Van Buren county court houses in order to receive compensation for livestock killed either by dogs or coyotes will be recorded. These claims will be checked frequently and verified by field necropsy whenever possible.
  - c. Field Necropsy: All livestock producers in the study area will be interviewed and asked to cooperate in the damage assessment efforts by contacting me whenever they experience livestock losses caused by dogs or coyotes. These carcasses will be examined by field necropsy techniques similar to Bowns et al, (1973). Kill site evidence such as tracks and hair will also be recorded.
  - d. Post Cards: Post card questionnaires will be sent out to cooperating sheep producers in the study area to determine the chronology of losses attributed to the different causes.
- ### 2. Evaluate plausible influences of various husbandry practices and habitat on sheep losses to coyotes.

Husbandry practices such as confinement, fencing, size of pasture and carcass disposal of representative livestock producers as well as habitat types in the study area will be recorded and compared to the rates of livestock losses to coyotes, dogs, and other causes.

3. Evaluate current methods of predator control.

Predator control in Iowa is carried out on a volunteer basis by resident hunters and trappers. The effectiveness of these methods in the study area will be evaluated by collecting information on hunter and trapper success, the selectiveness of the control methods, and by comparing the incidences of losses in the areas where predator control is used with areas where no control is employed.

4. Determine the economic impact of the coyote in southern Iowa.

A benefit-cost analysis will be established for the coyote in southern Iowa. Some of the benefits are: recreational opportunity for hunters and trappers, income received from bounties and pelts, and control of destructive rodents. Some of the costs are: livestock damage and costs of control and deterrent methods.

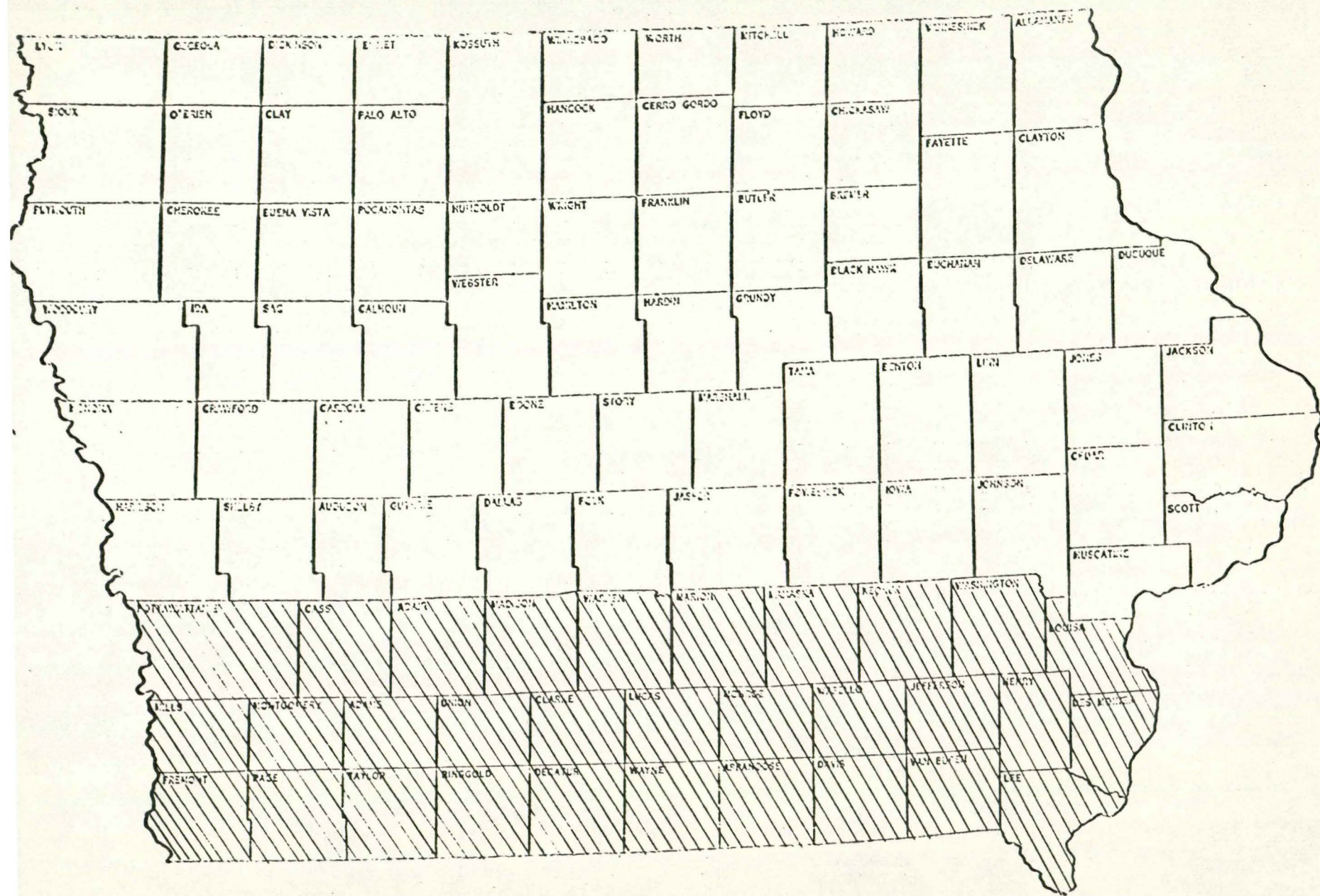
PROGRESS

1. Enumerate sheep losses to coyotes, dogs, and other causes.

a. Questionnaire: The livestock industry in Iowa is concentrated in the southern portion of the state where much of the land is not suitable for extensive cultivation. A list of sheep producers that reside in the 31 southern Iowa counties and that received wool incentive payments for 1974 was obtained from the Agricultural Stabilization and Conservation Service. This list was believed to represent 82 percent of the total sheep producers because low wool prices for 1974 influenced some farmers to hold their wool until the market was more favorable.

A questionnaire (Appendix A) was developed under the supervision of livestock extension personnel, survey analysts, the state biometrician, and committee members and sent to the 3,173 sheep producers on this list in January 1976 (Figure 2).

Figure 2. Portion of Iowa that was sampled by the questionnaire (shaded area).



One follow-up was sent in April to those that did not respond to the original mailing. Fifty-one percent or 1,617 people responded with 357 of these indicating that they did not raise sheep in 1975 for various reasons (Table 1). The remaining 1,260 responses are considered to be representative of the Iowa sheep industry and acceptable for analysis.

Table 1. Reasons given for quitting the sheep business by respondents who indicated they did not raise sheep in 1975.

<u>Reasons</u>	<u>Number of Respondents</u>	<u>Percent</u>
No reason given	290	81
Previous coyote problems	54	15
Previous dog problems	8	2
Death	<u>8</u>	<u>2</u>
	357	100

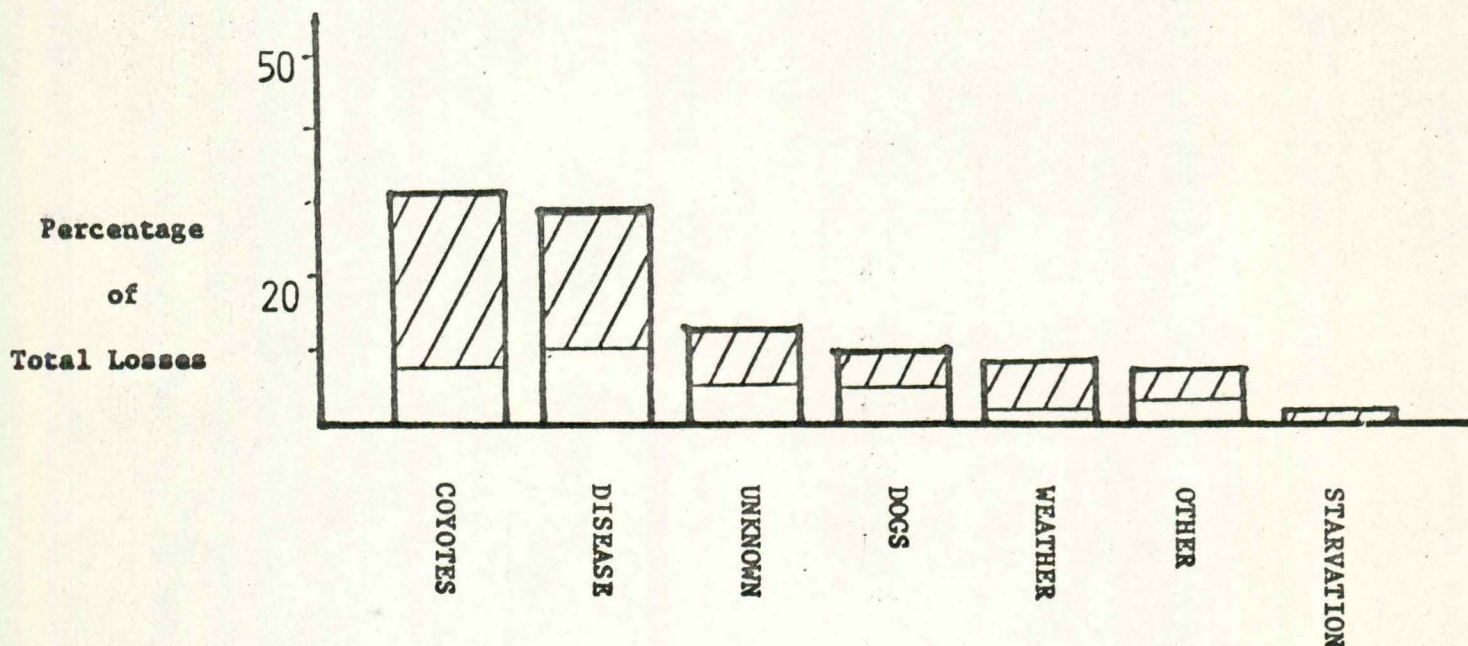
I have extracted some preliminary information from these responses concerning the losses and control methods. The total number of sheep reported in the survey was 98,572 (42,474 ewes; 45,872 lambs produced; and 10,226 feeder-lambs). The average flock size for the 1,260 sheep producers in 1975 was 33.7 ewes and 36.4 lambs. Twenty-seven of these respondents bought feeder-lambs in addition to their own raised flocks for an average of 378.7 lambs bought per buyer. The sheep reported lost to all causes are listed in Table 2. Total sheep losses were 9.6 percent of the total number of sheep owned.

The major cause of mortality was reported to have been coyote predation which accounted for a total of 3,003 sheep losses or 31.6 percent of all losses (Figure 3). This is a loss of about 3 percent of the 98,572 sheep reported on this survey, 4.2 percent of lambs, and 1.5 percent of ewes.

Table 2. Sheep losses attributed to the causes listed in the questionnaire, expressed in actual numbers and percentages of the total number in each age class.

	<u>Coyote</u>	<u>Disease</u>	<u>Unknown</u>	<u>Dog</u>	<u>Weather</u>	<u>Other</u>	<u>Starvation</u>	<u>Totals</u>
No. of Lambs	2,367	1,952	723	444	640	341	130	6,597
% of Lamb crop	4.2	3.5	1.3	0.8	1.1	0.6	0.2	11.6%
No. of Ewes	636	816	524	505	105	306	4	2,896
% of Ewe crop	1.5	1.9	1.2	1.2	0.2	0.7	T	6.8%
Total No. Lost	3,003	2,768	1,247	949	745	647	134	9,493
% of all Sheep	3.0	2.8	1.3	1.0	0.7	0.6	0.1	9.6%

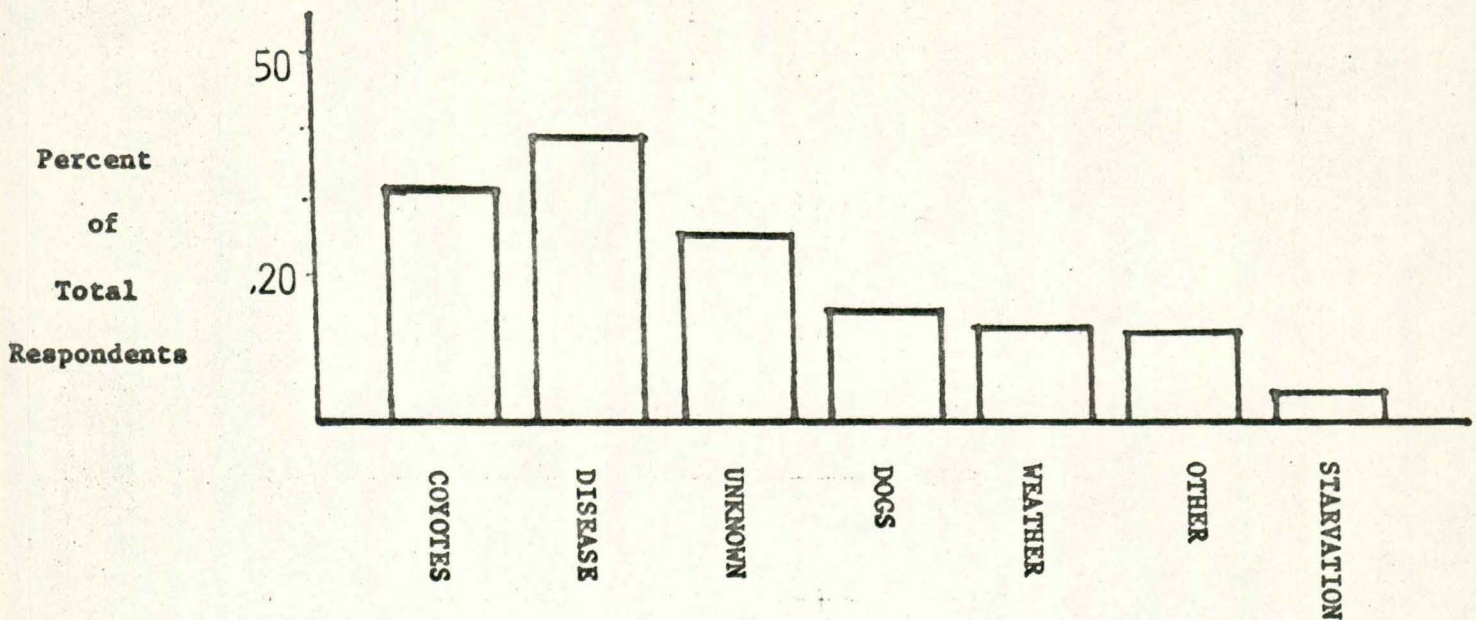
Figure 3. Sheep losses attributed to each cause shown as percentages of the total losses. (Shaded areas indicates the proportion of each cause represented by lambs lost).



Biases in information obtained from surveys are of course possible. But the majority of respondents indicated they had no problems with coyotes (Figure 4).



Figure 4. The percentage of the total number of respondents (1,260) that indicated losses due to the respective causes.

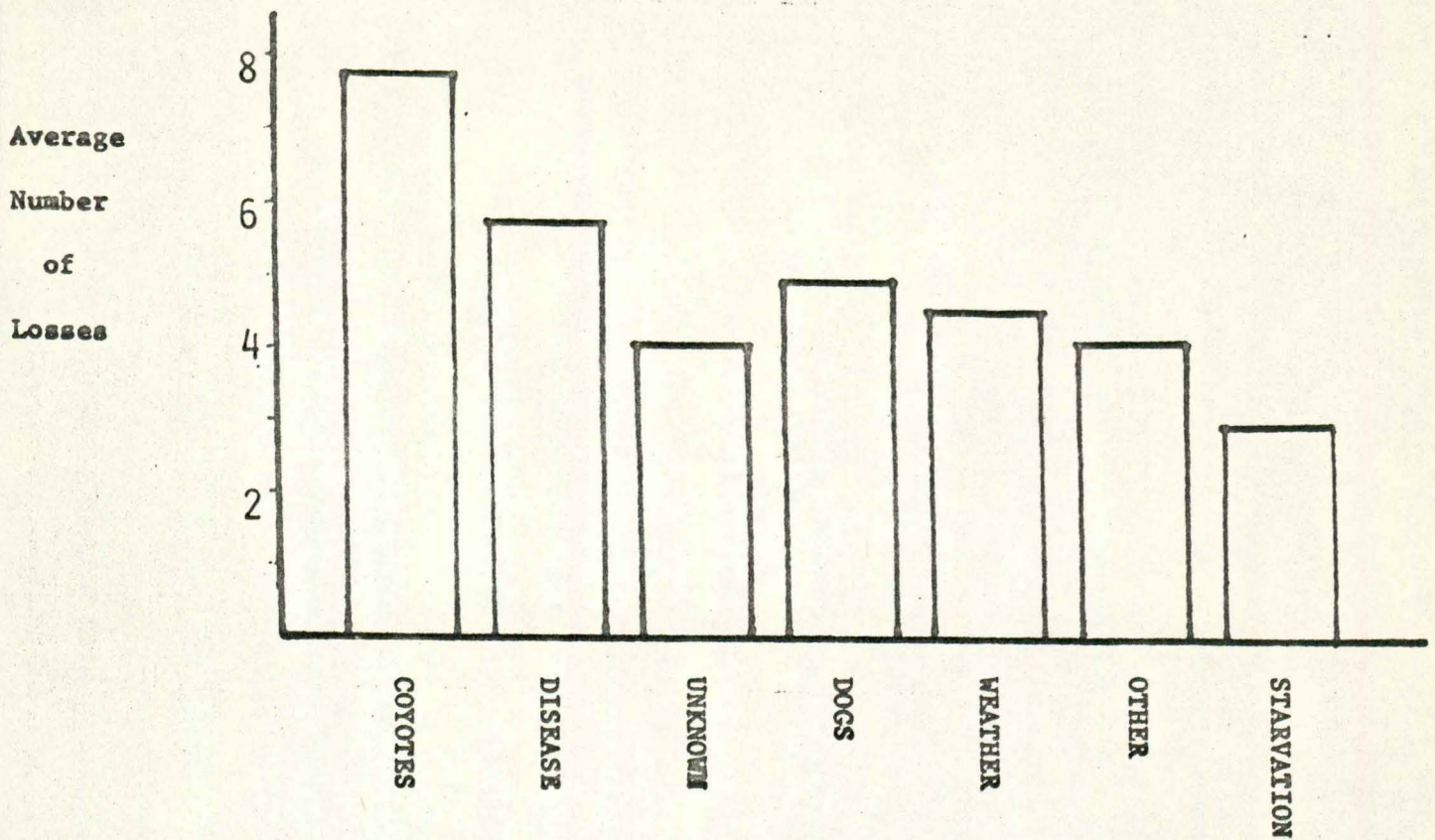


Besides coyote predation, disease is the only other mortality factor which accounted for more than 1.5 percent of the total number of sheep. Two thousand seven hundred and sixty-eight sheep losses, or 29.2 percent of the total losses were attributed to disease (Figure 3).

It is also interesting to note that although coyote predation was the major cause of mortality reported, losses to disease were more widespread (Figure 4). Therefore, the average number of losses due to coyote predation for the operators that reported these losses was greater than the average for operators reporting losses due to disease (Figure 5).

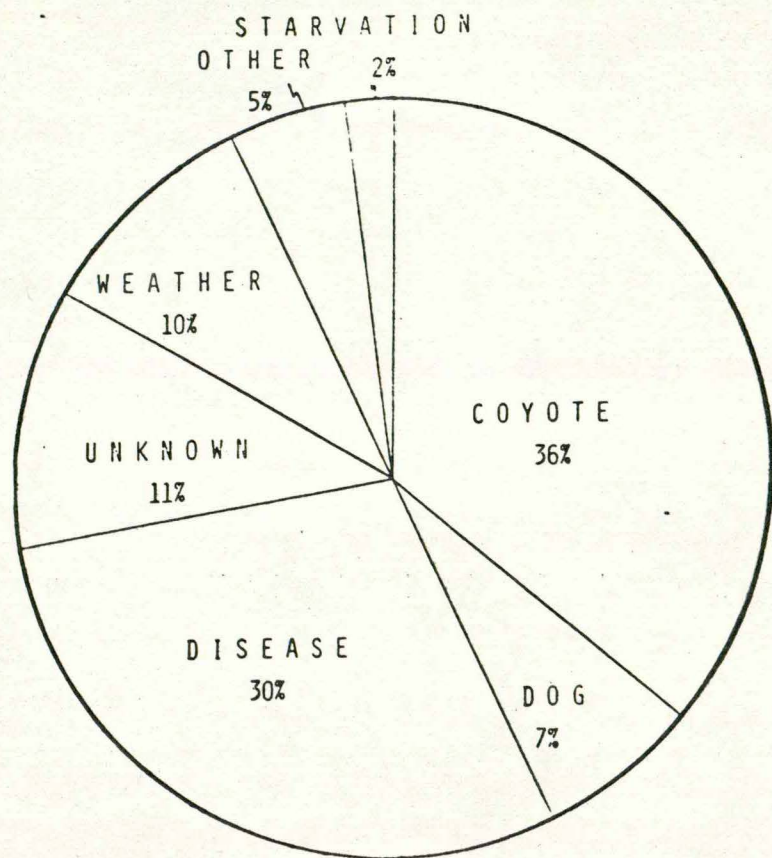
The number of sheep lost to dog predation was 949 or 10.0 percent of the total number of losses (Figure 3). This was only 1.0 percent of the total number of sheep reported.

Figure 5. Average number of losses for the operators that reported losses for the respective mortality causes.

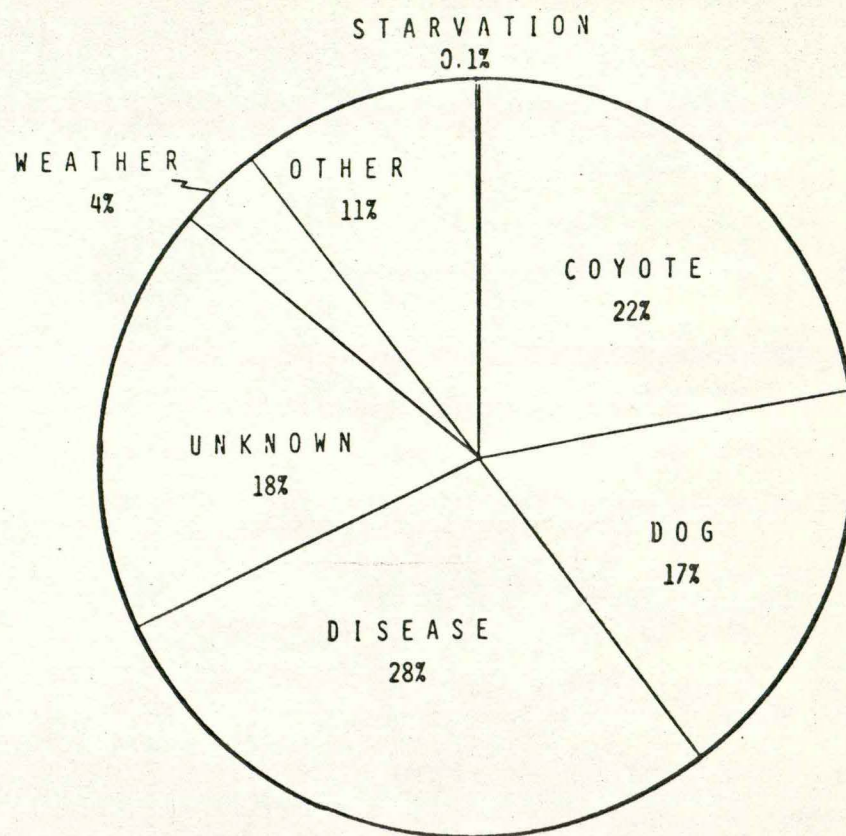


Most mortality factors except dog predation were more selective for lambs than ewes. This survey suggest that coyote predation is very age selective with lambs accounting for 78.8 percent of the total sheep losses attributed to this cause (Table 3). Coyote predation accounted for 36 percent of all lamb losses and only 22 percent of ewe losses (Figure 6). Dog predation almost made up the difference though as 7 percent of lamb losses and 17 percent of ewe losses were attributed to this cause.

Figure 6. Causes of mortality shown as proportions of total losses of Lambs and Ewes.



LAMB LOSSES



EWE LOSSES

Table 3. Lamb and ewe losses expressed as proportions of the total losses attributed to each respective mortality factor.

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	<u>Lambs</u>	<u>Ewes</u>
Starvation	97.0	3.0
Weather	86.0	14.0
Coyotes	78.8	21.2
Disease	70.5	29.5
Unknown	58.0	42.0
Other	52.7	47.3
Dogs	46.8	53.2

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Forty-seven respondents in the study area of Davis and Van Buren counties reported almost two-thirds of the predator-killed sheep attributable to coyote predation (Table 4). The operators that had coyote problems lost an average of about 10 sheep to this cause during 1975. The operators with dog problems averaged about the same as that for coyotes.

Table 4. Predator-caused losses in the Davis and Van Buren county study area during 1975 as reported from the questionnaire.

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	<u>Coyote</u>	<u>Dog</u>
No. of operators with losses	47	27
No. of losses	479	266
Average No. of losses/operator	10.2	9.8

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b. Domestic Animal Claims: According to the Domestic Animal Claims filed in 1975, more sheep were killed in the study area by dogs than coyotes (Table 5). This information seems to be contradictory to the questionnaire data in Table 4. But it is difficult to compare the information from these two sources because

of the different motives for bias in each. The possible biases of the questionnaire have already been discussed in the previous section.

Table 5. Predator-caused losses in the Davis and Van Buren County study area during 1975 as recorded from the Domestic Animal Claims.

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	<u>Coyote</u>	<u>Dog</u>
No. of operators with losses	32	29
No. of losses	130	189
Average No. of Losses/operator	4.1	6.5

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In order for a Domestic Animal Claim to qualify for compensation in Davis county, the claimant must contact the supervisors and arrange to show them the damage caused by either dogs or coyotes. In Van Buren county the claimant must obtain signatures from two unrelated witnesses in order to verify the claim. In both counties the claimant must appear in person at the court house within 10 days of the incident to fill out a claim form. These requirements were enacted in order to eliminate false claims. It makes no difference to the supervisors or claimant whether dogs or coyotes actually did the killing because the claim is honored just the same for both causes.

Many sheep producers are reluctant to file claims when only one or two sheep are killed because they feel that the incentive of being compensated only a percentage of the actual value of the claim is not worth their efforts to fulfill the necessary requirements. But when several sheep are killed, the incentive is more attractive. Therefore, I believe that while the Domestic Animal Claim records are fairly accurate for the mass killings of sheep which is more typical of dog predation, they underestimate the

losses which occur when only one or two sheep are killed at a time, which is typical of coyote predation. Dog-caused losses are also more obvious and easier for an operator to detect as the dogs are usually quite vocal as they chase and attack sheep and dogs are also not as reluctant to enter corrals and buildings as are coyotes.

Even though the Domestic Animal Claims may not be entirely representative of the actual losses occurring in a given county, they do provide a means for determining the credibility of the alleged claims. From May 1st to September 1st I checked the Domestic Animal Claims filed in both Davis and Van Buren counties at least every two days and then attempted to verify these claims by examining the carcasses myself. I examined a total of 95 carcasses that were claimed in Davis and Van Buren counties and also two others that were claimed in Appanoose county which borders Davis county on the west. I agreed with the claimants' assessments on 84 carcasses and disagreed on the remaining 13 (Table 6). This would give a 88.4 percent credibility to the Domestic Animal Claims that I examined.

Table 6. Domestic Animal Claims verified during the summer of 1976.

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	<u>Coyote</u>	<u>Dog</u>
Domestic Animal Claims	54	43
My Assessment	43	54

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According to the Domestic Animal Claims filed in 1975, 32 operators claimed 130 sheep were killed by coyotes in the study area (Table 5). This average of 4.1 sheep killed per operator is somewhat lower than the average from the questionnaire data for the same area probably because of the

inaccuracies that have already been discussed.

C. Field Necropsy: The results of my field necropsies are listed in Table 7. I agreed with 61 of the 70 operators' assessments for sheep losses caused by coyote predation and all but one of those assessed as caused by dog predation. This latter case is the only one where the operator blamed dogs for a loss caused by coyotes. He did so because he had previous problems with dogs killing his sheep and did not closely examine this carcass but assumed that dogs were again responsible. Therefore, according to my assessments, 132 or 92.2 percent of the 142 carcasses necropsied were assessed correctly by the operators. Sheep producers with whom I did not agree did not intentionally make false claims but rather were unfamiliar with interpreting the evidence because they had little or no previous experience with predators killing their sheep.

Table 7. Field assessment of predator-caused losses from May 1 to September 1, 1976. (If a person lost sheep to both coyotes and dogs, that person was recorded as an operator under each).

		Coyote	Dog	Non predator
My Assessment	Operators	25	12	1
	Losses	62	79	1
Operator Assessment	Operators	28	7	
	Losses	70	72	

Coyote selection for lambs was also indicated from my field data. Fifty-eight of the 62 sheep killed by coyotes were lambs while only 41 of the 79 killed by dogs were lambs. Most of the dog problems are caused by what

Denny (1974) termed as "uncontrolled" dogs rather than "stray" or "feral" dogs. Most dog owners are unaware that their dogs have the potential to be sheep killers and do not keep them tied up or controlled. Evanson (1970) noted that sometimes sheep dogs, while trustworthy among their own flock, will prey on neighboring flocks.

Even though I examined more total numbers of sheep killed by dogs, I found the coyote problem to be more widespread. Twenty-five operators experienced coyote depredations while only 12 operators had dog depredations. The average loss per incident is quite a bit less for coyote predation at 1.3 with a range of 1 to 4 compared to 5.6 for dog predation with a range of 1 to 21. But over a period of time coyotes may kill more frequently than dogs. From May 1st to September 1st, I verified 20 coyote-killed sheep involving 14 separate incidents for one sheep producer. This same producer claimed a year long coyote-caused loss of 37 sheep from 22 incidents.

While these total figures for predator-caused losses are by no means meant to represent the actual numbers that were lost in the study area they are felt to be a representative sample of the total losses. I was told of at least twice as many losses caused by coyotes as I investigated but was unable to examine the carcasses because they had already been disposed of or the time lapse was so long that the evidence was no longer apparent. During the mid summer months carcasses decomposed quickly and it was difficult to determine the cause of death for animals that had been dead more than four or five days. The rate of decomposition varied according to the weather, location of the carcass, wool length, and whether or not the sheep had been eaten upon and the amount eaten by the killing animal or scavengers.

Quite often sheep producers themselves were not aware of sheep losses until after the carcasses were fairly decomposed. This is evidenced by



the fact that 13.1 percent of the total sheep losses reported in the questionnaire were attributed to unknown causes (Figure 3).

Nevertheless, it is interesting to note that my assessment of the proportion of predator-killed sheep that was attributed to dogs and coyotes is comparable to the Domestic Animal Claims information for the same time period even though they represent different claims (Table 8).

Table 8. Comparison of Domestic Animal Claims with field assessments in the study area from May 1 to September 1, 1976.

		Coyote	Dog
Domestic Animal Claims	Operators	21	13
	Losses	103(56%)	85(44%)
My Assessment	Operators	23	10
	Losses	59(46%)	69(54%)

D. Post Cards: I have received monthly post cards since January 1976 from about 85 respondents in my study area. This information will be analyzed at a later date to determine the chronology of coyote, dog, and other caused losses.

- Evaluate plausible influences of various husbandry practices and habitat on sheep losses to coyotes.

I have not analyzed all of the data on the effects of different husbandry practices on coyote predation, but the effects of some management practices do not seem to be very apparent. Coyote predation is so sporadic that it is often difficult to determine whether a certain practice is

actually affecting the predation rate or whether the coyotes are merely not attempting to kill any sheep at that particular time and in that particular location. Coyotes seemed to become conditioned or habituated to kill sheep from certain flocks in a given area. In several situations coyotes killed more sheep from operations where the sheep were managed more intensively and coyote deterrents were used to a greater extent than any neighboring operations.

It does seem, however, that some type of confinement for sheep might help to reduce losses to coyotes. I examined only seven sheep that were killed by coyotes in small corrals less than 4 acres in size and all but one of these corrals was connected or adjacent to a building. Meduna and Robel (1976) also found a greater percentage of coyote kills occurring in pastures than in corrals. But they also stated that many of these losses in pastures occurred during the daytime in flocks that were confined at night.

The effectiveness of lights as a coyote deterrent is questionable. Five of the seven confinement situations in which sheep were killed were also artificially lighted. However, Meduna and Robel (1976) found losses to coyotes were much higher in unlit corrals than in lit corrals.

Some pastures are located several miles from permanent corrals where the sheep might be lotted at night. In these situations only a few operators used temporary corrals which they constructed out of fence panels in the pasture.

Other deterrents used by sheep producers are belled collars, goats, noise deterrents, sheep dip, saddled mares, and watch dogs.

Rather than serving as a direct coyote deterrent, some management practices might affect the behavior of sheep and indirectly make them less susceptible to coyote predation. Sheep that are confined in small lots are possibly less inclined to take flight from the sight of a coyote on the outside

of the lot and therefore, provide no stimulus for the coyote to pursue. Connolly et al, (1976) found that sheep which took flight were more vulnerable to attack from the coyotes.

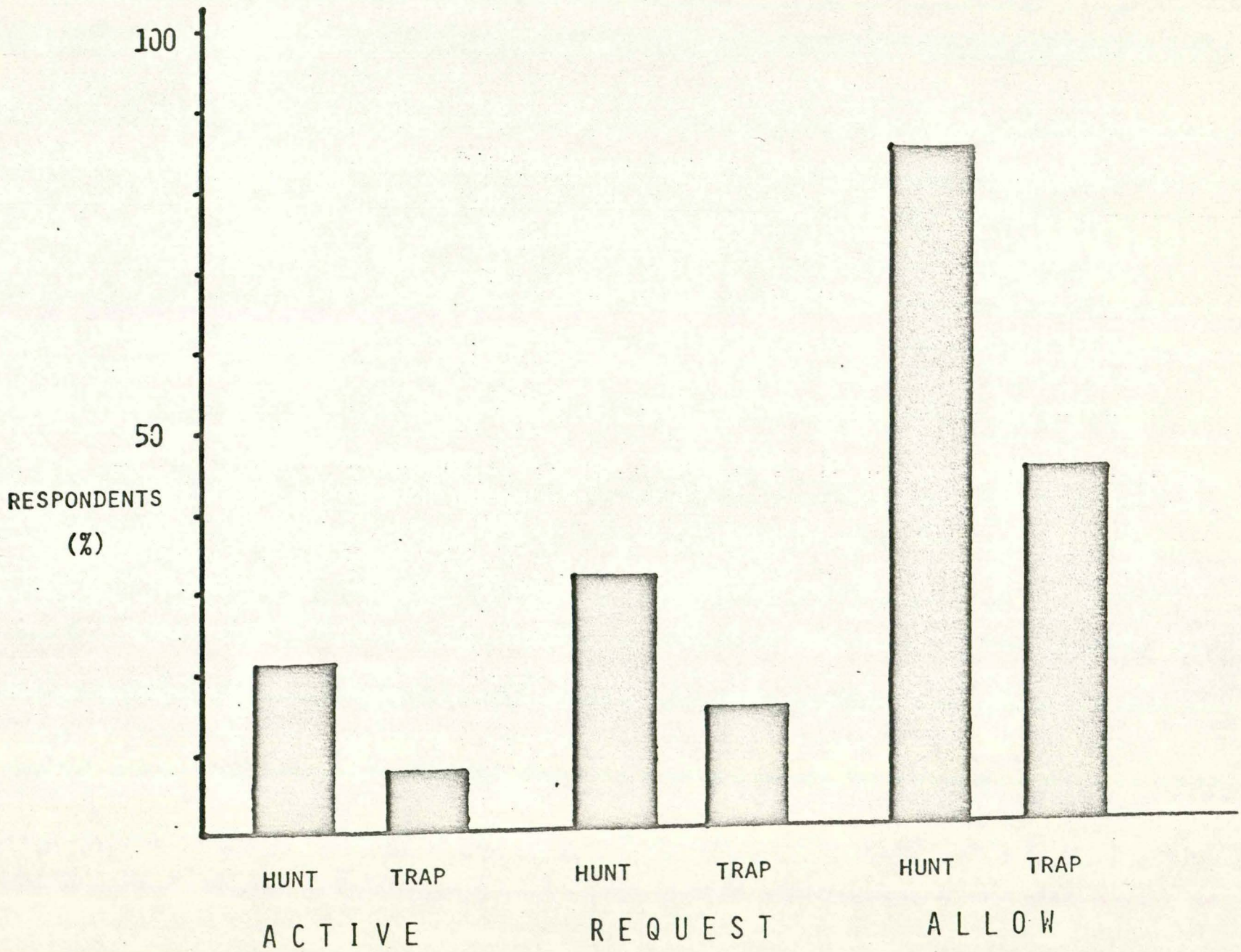
I have not finished cover typing the study area and will analyze the habitat types and compare them to the incidence of coyote-caused losses at a later date.

### 3. Evaluate current methods of predator control.

There are two basic methods of control used in the study area - hunting and trapping. Most of the hunting is voluntary and carried out by the use of trail-dogs and several hunters. The success of this type of hunting is highly dependent on the weather which affects the ability of the dogs to find and hold the coyote's trail. Because of the ideal weather conditions, more free time available for the hunters, and higher prices for the pelts almost all of the coyotes are harvested during the winter months. It is difficult to be successful with this control method during the hot and dry summer months when, ironically, most of the coyote problems occur. According to the information obtained from the questionnaire, only about 20 percent of the sheep producers actively hunted coyotes (Figure 7). But 83 percent of them allowed coyote hunting on their land. From my associations with the hunters in the field I have found that the sheep producers have a certain amount of respect for coyote hunters and rely heavily on the success of a few of the more experienced hunters to eliminate the problem coyotes. For the most part though this method of control is indiscriminatory in function. Rather than focusing on the few problem-coyotes the hunters' aim is to reduce the coyote numbers so that the chances of having coyote problems is lessened.

Even though trapping may be a more effective means of control, it is less popular. And, for the same reasons as hunting, most coyotes are harvested by trappers in the winter.

Figure 7. Predator control methods used by operators as indicated from questionnaire data. The operators may actively hunted or trapped, requested hunting or trapping, or allowed hunting or trapping.



4. Determine the economic impact of the coyote in southern Iowa.

I am still obtaining information on this aspect of my study and do not have significant results at this time. However, in my final analysis I hope to present the impact on individuals as well as southern Iowa as a whole because the benefits and costs are not shared by the same people.

#### PLANS

I will extend this year's field season from May 1st until November 1st in order to obtain information on losses, husbandry practices and controls for the entire grazing season.

I will then begin to analyze my data and write my thesis.

I plan to graduate in the spring of 1978.

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APPENDIX A

Please fill out this questionnaire to the best of your knowledge, ability and memory. We would like as accurate information as possible pertaining to only the calendar year 1975.

1) What breeds of ewes did you use for lambing in 1975?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

2) What breeds of rams did you use for lambing in 1975?

\_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_.

3) How many mature ewes did you use for the 1975 lambing season? \_\_\_\_\_.

4) How many feeder lambs did you market prior to the 1975 lambing season? \_\_\_\_\_.

5) How many immature ewe-lamb replacements did you have prior to the 1975 lambing season? \_\_\_\_\_.

6) Please check all months during which your ewes lambed in 1975.

\_\_\_ Jan., \_\_\_ Feb., \_\_\_ Mar., \_\_\_ Apr., \_\_\_ May, \_\_\_ Jun.,  
\_\_\_ Jul., \_\_\_ Aug., \_\_\_ Sep., \_\_\_ Oct., \_\_\_ Nov., \_\_\_ Dec.

7) Please state the one month in which most of your ewes lambed. \_\_\_\_\_.  
(month)

8) In 1975, did your lambing operations take place in:

a. individual lambing pens in enclosed sheds	___ Yes	___ No
b. enclosed sheds without individual lambing pens	___ Yes	___ No
If yes to a. or b. - was the shed heated?	___ Yes	___ No
c. pasture	___ Yes	___ No
d. small lots	___ Yes	___ No
If yes to d. - was the lot lighted?	___ Yes	___ No

9) Please check all months in which you sheared your sheep in 1975?

\_\_\_ Jan., \_\_\_ Feb., \_\_\_ Mar., \_\_\_ Apr., \_\_\_ May, \_\_\_ Jun.,  
\_\_\_ Jul., \_\_\_ Aug., \_\_\_ Sep., \_\_\_ Oct., \_\_\_ Nov., \_\_\_ Dec.



10) For treating orphan lambs in 1975, did you:

- a. use a milk replacer  Yes  No  
b. leave them alone  Yes  No  
c. use adoption by other ewes  Yes  No

11) Did you graze your sheep in 1975?  Yes  No

If No, skip to question 18.

If Yes, please answer the following questions.

12) In 1975, what month did you turn your sheep out to pasture?                     .  
(month)

13) Did you bring them in at night?

- Always  
 Sometimes  
 Only during bad weather  
 Never (If never, skip to question 15)

14) If you did bring them in at night, was the night area:

- a. in an enclosed building  Yes  No  
b. partially enclosed and partially fenced  Yes  No  
c. entirely fenced  Yes  No  
d. lighted  Yes  No

15) How often did you closely observe or count your sheep while in pasture?

- Daily  
 A couple of times per week  
 Weekly  
 Every other week  
 Monthly  
 Once during the season  
 Never

16) Did you run goats with your sheep while in pasture?

- Always  
 Sometimes  
 Never

17) Are you using any type of fencing that was designed for the purpose of keeping predators out of pastures and feed lots?  Yes  No

18) Before marketing in 1975, did you:

- a. finish your lambs in dry lots  Yes  No
- b. graze your lambs on fresh, new pasture  Yes  No

19) Did you use preventive measures such as vaccinations or medications for the following diseases in 1975:

<u>Disease</u>	<u>Lambs</u>		<u>Ewes</u>	
Internal parasites (worms) . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Enterotoxemia (overeating) . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Pregnancy toxemia (lamb paralysis) . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
White muscle disease (stiff lamb) . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Pneumonia . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
White scours . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Tetanus . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Coccidiosis . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Mastitis (blue bag) . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Other (specify) _____ . . . . .	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Yes	<input type="checkbox"/> No

20) How many lambs or ewes did you lose in 1975 from the following causes:

<u>Causes</u>	<u>Number of lambs</u>	<u>Number of ewes</u>
a. disease	_____	_____
b. weather	_____	_____
c. starvation	_____	_____
d. coyotes	_____	_____
e. dogs	_____	_____
f. other _____ (specify)	_____	_____
g. unknown	_____	_____

21) When handling sheep carcasses in 1975, did you:

- a. bury them  Yes  No
- b. give or sell them to the rendering works  Yes  No
- c. leave them in the pasture  Yes  No
- d. move them to another area out of the pasture  Yes  No

22) Did you own a sheep-herding dog in 1975?  Yes  No

23) In 1975 did you:

- a. hunt coyotes  Yes  No
- b. trap coyotes  Yes  No

24) In 1975 did you allow others to:

- a. hunt coyotes                 Yes      No
- b. trap coyotes                Yes      No

25) In 1975 did you request:

- a. coyote hunting on your land           Yes      No
- b. coyote trapping on your land          Yes      No

26) How many years have you farmed alone or in partnership? \_\_\_\_\_  
(years)

27) What is your age at the present time? \_\_\_\_\_  
(years)

28) In 1975, how many acres of land did you:

- a. own and operate \_\_\_\_\_ acres
- b. rent from others and operate \_\_\_\_\_ acres

29) Of the total acreage that you farmed in 1975, how many of these acres were used for the following purposes:

<u>Purpose</u>	<u>Number of acres</u>
a. crop land . . . . .	_____ acres
b. pasture:	
- sheep pasture . . . . .	_____ acres
- for other livestock (not including sheep pasture acreage). . . . .	_____ acres
c. timber . . . . .	_____ acres
d. other (buildings, roads, etc.). . . . .	_____ acres

30) How many years (if any) have you raised the following:

<u>Livestock</u>	<u>Number of years</u>
Sheep	_____ years
Hogs	_____ years
Cattle	_____ years
Turkeys	_____ years

31) In 1975, did you have any:

- a. stock cows         Yes      No            If yes, how many? \_\_\_\_\_
- b. brood sows         Yes      No            If yes, how many? \_\_\_\_\_
- c. turkeys             Yes      No            If yes, how many? \_\_\_\_\_

32) How many (if any) livestock (other than sheep) did you lose in 1975 from the following causes:

<u>Causes</u>	<u>Number of Cattle lost</u>	<u>Number of Hogs lost</u>	<u>Number of Turkeys lost</u>
a. disease	_____	_____	_____
b. weather	_____	_____	_____
c. starvation	_____	_____	_____
d. coyotes	_____	_____	_____
e. dogs	_____	_____	_____
f. other _____ (specify)	_____	_____	_____
g. unknown	_____	_____	_____

Thank you for taking time to answer this questionnaire. If you have any additional comments concerning the questionnaire or the entire project, please feel free to use the remaining space below.

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