AN EFFECTIVE PROGRAM IN COYOTE DAMAGE CONTROL

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Kansas is a prairie state where about 2 million people live. In Kansas there are around 75,000 farms and ranches. Sheep are raised on approximately 1500 farms, either under farm-flock or feeder lamb systems. In January of 1983 there were approximately 200 thousand sheep and 1.7 million calves in Kansas. Kansas ranks 7th in the nation in swine production.

Scattered throughout Kansas there are many coyotes. Coyotes seem to be at home in Kansas, as they have been living in this area for thousands of years. We believe there are approximately 150 thousand coyotes in early summer of a normal year. There are 82,000 square miles in Kansas.

Over the years, the people who have been most adversely affected by coyotes have tried many approaches to solving the problem. Kansas paid a bounty on coyotes for 92 years, from 1878 to 1970, and between 1903 and 1968 several other kinds of programs were started. However, apparently because of the independent nature of the Kansas farmers and ranchers, and the fact that the habitat in Kansas is seemingly ideal for coyote survival, these programs failed to last.

In July of 1968, following a great deal of debate about coyote damage, all State and Federal agencies which had been involved in coyote damage control shifted the responsibility to the Kansas State University Cooperative Extension Service.

One extension specialist was given the task of initiating an educational program in coyote damage control. When the program was started livestock producers and county extension agricultural agents adopted a "wait and see" attitude. The program was started slowly and calls for help were attended to quickly. Both short-term and long-term plans were developed. We started an educational program to help people understand the coyote problem. This involved giving facts about coyotes to any interested citizen(s). We developed booklets, slide-tape sets, movies, radio and TV presentations, classroom and public meeting presentations.

In these we wrote and spoke that coyotes are opportunists, individualists, and animals of habit. We helped people understand the coyote by teaching basic coyote biology. We pointed out that the coyote is an important renewable as well as an aesthetic resource (Henderson and Boggess 1981). We devoted much of our teaching effort to compensation of coyote populations to humans' efforts to reduce coyote populations. Ideas suggested by field observations (Henderson 1972, Wagner 1975) and substantiated by studies (Knowlton 1972, Connolly 1978) have shown that there is a relationship between population size and the number of pups that survive. In a high breeding population there is a tendency toward lower pup survival. When the breeding population is lowered the tendency is toward higher numbers of young born and greater pup survival. So with present knowledge, it seems unlikely that a coyote population can be reduced, except in a limited geographical area and then only for a short time.

In 1968, the food and feeding habits were not well understood by people. Most people tended to believe that coyotes spent every awake minute in search of a lamb or other type of livestock to kill. Not all coyotes kill livestock. Based on my fifteen years of experience in Kansas usually only one coyote is responsible for killing livestock in a given situation and when that coyote is removed, the killing stops. Removal of the killer coyote can be accomplished by trained producers.

Some factors contribute to the amount and extent of coyote damage in most situations. In Kansas, coyotes tend to be more of a problem from February through October of each year than at other times. In Kansas 50% of lambing occurs in November. Since this does not occur with the spring coyote whelping time many Kansas sheep producers avoid chances for losses. Another contributing factor to fewer losses in Kansas is that most lambs are born in sheds or barns, out of reach of coyotes.

Most calves are born in the early spring in Kansas. This often puts a great deal of stress on the cows and calves, because of cold, wet and snowy weather. This occurs when the coyote population level is at its lowest level for the year. This helps keep calf losses to coyotes low.

In 1969 we developed a wildlife damage control handbook for county extension Agricultural Agents. This handbook has been kept up to date and we presently are in the process of developing a procedures manual. County Agents reported using the handbook at least once a week during the year. If that use resulted in a savings of just $50 per request for information, then this represents a savings of $262,500 per year for people in Kansas. This was due to the educational assistance provided by county extension agents.

The most important part of our program is to help the producer reduce losses. We have good contact with

producers through the County Extension Council Offices. In Kansas, there are 105 counties with a County Extension Council Office in each county. We also work closely with the Kansas Fish and Game Commission and their employees; the Kansas Sheep Producers Association; and the Kansas Livestock Association; as well as other producer groups. There seems to be good general support for the program in Kansas. We received increased funding in 1975 and a legislative interim committee recommended increased funding in 1983.

In a state with perhaps as many coyotes as any other state in the United States, Kansas livestock producers probably have fewer losses than producers in any other western state. At the beginning of the Kansas program in 1968, sheep losses to coyotes was thought to be around 3% of all sheep in the state. In 1976 losses were found to be less than 1% of all sheep.

When a Kansas livestock producer has a problem with coyotes, that producer can contact the nearest county extension office and request help. Since 1975 there have been two extension wildlife damage control specialists in Kansas. Bill Andelt is one and he lives in western Kansas at Garden City. He is responsible for 43 counties in the western part of the State. I live in Manhattan and I am responsible for 62 counties in the central and eastern parts of the state. The Cooperative Extension Service in Kansas is the only state or federal agency that has a program in wildlife damage control in the state. All funds up until 1984 have been provided by state appropriations from the general fund. In the future, the state wildlife agency may become more involved than in the past. This will have been more in response to other kinds of wildlife damage problems, than because of the coyote problems.

We have well-equipped trucks and carry with us all of the tools necessary to teach producers how to catch coyotes and hopefully reduce, if not prevent, further losses. We try to respond to calls quickly, arriving at the site of loss within 3 days time. We either meet with groups of producers who gather at a site or, most often, we work with an individual on the site where the losses occurred. We work at the convenience of the producer, often early in the morning or later in the evening. Actually, these are better times to work in teaching because of the habits of coyotes, as they tend to move around more at these times.

At first we talk to the producer(s) about the problem. Asking questions like: When did the last kill occur? When was one before that? Did you see the coyote(s)? Do you see coyotes often? Where do you see them most often? Are there any stray dogs around? Do you let your pet dog(s) run loose? Do you pen your sheep at night? Is there a light over the pen? How many ewes do you have? How long has it been since you had losses prior to this time? All of these questions and more would probably be asked. We have to be good listeners and once we have an idea of the situation, then we ask the producer to walk around with us, looking for sign and at the dead livestock, if present.

We point out coyote tracks and likely travel routes of the coyote. Upon examination of the dead livestock, we point out the teeth marks, and other sign typical of a coyote kill. Sometimes we find the cause of death was not a coyote. However, after 15 years of teaching producers what to look for, we feel that most Kansas producers are sure of what killed their livestock once they look at the evidence and report. We record data on a standardized recording sheet prior to leaving the site.

Very likely a next step we would discuss would be coyote capture methods. We encourage the use of methods which are as efficient, safe, economical, humane, and selective as possible. Generally, that would be the use of leg-hold traps or neck snares. In 1984 we are going to add the use of M-44's. Other tools presently used might include the use of dogs or calling. In other cases we might suggest a propane exploder to scare the predator away. But usually a leg-hold trap is chosen, in which case, we would begin to point out good set locations and explain why those are good places to set traps. We teach producers to rely on common sense and to take advantage of the natural instincts of the coyotes. We avoid setting traps next to carcasses of recently killed livestock. But in cases where the coyote returns to a kill, we advise setting the traps upwind and a few yards away.

The specialist sets the first set, with the producer(s) looking on. We carefully explain each step. Especially, each trap part, its function, and how to bury the traps in the ground, how to bed the traps, how to place the trap pan cover under the jaws of the trap and over the pan. We teach producers to use a ground cloth to kneel on while placing the traps in the set. We do not wear gloves to teach coyote trapping. Most trap setting is in the warmer months when dry conditions prevail. We do not boil or dye new traps before setting. We do advise dying rusty traps so that they will close quickly and gloves are useful to prevent getting stickers in your hands. We teach producers to stake the traps down and fasten the trap chains to the stake using a lap link, welded shut. We prefer to use two 3N traps at a set. The use of two traps at a set increases the odds of a catch.

We sift soil over the entire set, covering traps, trap chains, and stake. We use coyote urine on a visual attraction placed between the two traps as a draw to the trap set location. We teach producers to set the traps in flat bare areas upwind from the normal travel route being used by the coyotes in the area of the kills. We show how to use stepping sticks, to guide the coyotes foot onto the trap pan.

If the soil would likely be subjected to freezing weather, then we recommend mixing $\frac{1}{4}$ table salt to $\frac{3}{4}$ dry soil over and around the traps, to prevent freezing which would prevent the traps from closing. We use a rib bone, wire or curved stick to even out and level the soil over the buried traps. We place 1 to 2 tablespoons of concentrated coyote urine on a cow chip or stick. The set should be checked each morning. Kansas law

requires this and also anyone setting traps or snares to affix a tag to each trapping device with the persons name and address on each tag.

After the set is completed we discard all unused soil, scattering it so as not to be conspicuous. The site of the set should be left as natural as possible. We teach the use of only one set, the scent post set. We believe this is the most selective set to use for coyotes in Kansas. The location of the set is actually more important than how the traps are set.

After the first set is completed, the producer sets the next traps. The specialist looks on making suggestions where necessary. The third set is also placed by the producer. Generally, three sets are all that are used per farm. We advise the producer that we cannot teach anyone how to become an expert coyote trapper, that comes with experience. We advise that in the long run it would be easier to avoid a coyote problem than to rely on coyote traps. When a coyote is caught it is shot and the traps reset in the same place. Even if a non-target animal is caught, we recommend re-setting the trap(s) in the same set. Losses often stop after one adult coyote is removed. Sometimes, no coyotes are caught, however the losses stop. We generally work an average of four hours with each producer we train. We leave printed information with the producer which describes the particular methods we taught that producer how to use.

We either sell all equipment needed by the producer at the time of training or leave the equipment with the producer on demonstration. The producer can either purchase or return the equipment later. We try to contact the producers two weeks after training to determine if they were successful in reducing the losses. If not, we return and assist the producer in a second training session.

For the purpose of this paper, I have provided a record of the results of 34 cases I was involved in between September 1, 1982 and September 20, 1983. During that time I actually was called in to help with a total of 50 coyote problems, however these 34 represent all the coyote/livestock conflicts. (The other cases related to coyotes eating watermelons or killing domestic pets.) A summary of these can be found in Table 1. In these 34 cases the total loss of livestock was valued at $13,220 and the average loss per producer was $389. In 28 of these cases losses were greatly reduced or stopped. A total of 72 coyotes were killed by the producers. As mentioned before, sometimes no coyotes are removed, but the losses stopped anyway.

Many of the coyotes killed were actually the coyote responsible for the loss. The benefits from this work will go on for many years. These coyotes could have perpetuated the killing habit in the neighborhood. These same people who have learned these techniques presumably will benefit substantially each year from their ability to reduce or stop coyote damage when and if it occurs again, so this will be an annual benefit over the years ahead. Hopefully, these producers will train others.

Actually, records show that about one-half of the respondents to questionnaires sent to producers we have given training told at least one or more persons something about the techniques used. How much benefit results from this additional training is impossible to estimate. However, the benefit would have to be substantial. The skills acquired by those trained would be transmitted to an increasing number of people each year. This type program is certainly a program with long-time benefits on an increasing scale.

The number of requests for assistance received in the early part of the program amount to approximately 200 per calendar year. The 1983 year will show an increase to about 75 requests for educational assistance from extension wildlife damage control specialists in coyote/livestock conflicts. This is an increase from 35 recorded in 1982 and 24 in 1981 (see Figure 1). This increase may be due, in part at least, (1) to new people entering the sheep production business; (2) reduction in volunteer effort due to lower pelt prices and higher gasoline prices; and (3) anticipation of reinstatement of use of M-44's and knowledge that an extension wildlife damage control specialist needs to recommend M-44 use.

After being involved in teaching people to take care of coyote problems for 15 years, two questions asked always seems to be (1) "How many problems do trained producers experience which we are not aware of?" and (2) "How many producers have problems and do not contact you because they feel you cannot help them?" Because of our contacts with livestock producers, we believe that there are not many serious problems of which we are not aware.

Beginning in October 1982 we requested that County Extension Offices and field personnel of the Kansas Fish and Game Commission send us monthly reports of the wildlife damage reported to their offices. In Figure 2, a summary of the state-wide coyote problems for 9 months (October 1, 1982 thru June 30, 1983) can be found. We realize this record has some duplication and we know all of these reports were not damage situations. However, we did not request any further information.

In this survey, our first attempt to gather state-wide wildlife damage reports, we found the reporting stations recorded a total of 182 citizen contacts (phone calls, office visits, or farm visits) concerning coyotes. We applied a $300 figure to each of the 182 calls reported regarding coyotes. This amounted to $62,000.

The cost to the taxpayers of Kansas wildlife damage control program was around $70,000 in 1983. This compares with $320,000 in Nebraska, $833,000 in Oklahoma (states similar to Kansas in livestock production), $700,000 in Colorado, and $108,000 in Missouri.

I believe you would agree that the value of a program should not be based on the amount of money the program costs. Coyote damage, I believe, is more a func-

Table 1. Coyote damage record by Henderson, September 1, 1982 to September 20, 1983, state report – Kansas

No.	Cty.	Date	Name	Herd Size	Prior Loss	After	Coyote
1	SN	06/83	*Mr. Robert Pearce*	*100 chickens*	*10 chickens*	0	1
2	PT	11/82	*Mrs. Bonnie Shoemaker*	*200 swine*	*20 piglets*	0	1
3	RN	05/83	*Mr. Jack Farney*	*500 ewes*	*6 ewes*	14	2
4	CS	04/83	*Mr. Deward Dailey*	*200 calves*	*3 calves*	0	1
5	MS	12/82	*Mr. Ken Stowell*	*100 swine*	*15 piglets*	0	1
6	MS	06/83	*Mr. DeWayne Polson*	*100 swine*	*7 piglets*	8	1
7	RN	05/83	*Mr. Harold Singleton*	*300 ewes*	*8 ewes*	0	1
8	SA	05/83	*Mr. Leland Johnson*	*250 calves*	*12 calves*	0	2
9	CY	05/83	*Mr. Lewis Bloom*	*150 ewes*	*3 lambs*	4 *ewes*	3
10	DK	05/83	*Mr. York Taylor*	*300 ewes*	*8 lambs*	4 *ewes*	3
11	LC	01/83	*Mr. John Wiebke*	*100 cows*	*2 calves*	0	2
	LC	01/83	*Mr. John Wiebke*		*1 cow*	0	
12	PT	03/83	*Mr. Robert Burgess*	*100 calves*	*5 calves*	3	1
13	CY	04/83	*Mr. Mike Leftwich*	*100 calves*	*4 calves*	0	0
14	OT	04/83	*Mr. Robert Boss*	*300 ewes*	*1 lamb*	5	3
15	BR	06/83	*Mr. Allen Winter*	*50 ewes*	*3 lambs*	0	0
16	WS	07/83	*Mr. James Smart*	*30 lambs*	*20 lambs*	8	0
17	LC	07/83	*Mr. Russell Frederking*	*300 ewes*	*30 lambs*	0	1
18	RN	09/82	*Mr. Bruce Shultz*	*400 ewes*	*12 lambs*	8	3
19	MR	03/83	*Mr. Terry Nelson*	*100 calves*	*2 calves*	0	2
20	MI	07/83	*Mr. Homer Dunnington*	*50 ewes*	*11 lambs*	8	0
21	RH	09/82	*Mr. Delven Kraft*	*400 ewes*	*14 ewes*	0	6
22	RP	10/82	*Mr. Marvin Bergstrom*	*8000 lambs*	*40 lambs*	210	26
23	WS	10/82	*Mr. William Hynek*	*100 swine*	*18 piglets*	0	2
24	SG	10/82	*Mr. Oran Winter*	*550 lambs*	*5 lambs*	0	0
25	SG	10/82	*Mr. Paul Blick*	*500 lambs*	*8 lambs*	0	0
26	EN	01/83	*Mr. Grant Wikoff*	*100 calves*	*3 calves*	0	0
27	NM	04/83	*Mr. Steve Knoblock*	*200 ewes*	*6 lambs*	0	2
28	CS	06/83	*Mr. Ted Scott*	*100 chickens*	*50 chickens*	0	0
29	RP	11/82	*Mr. Frankie Sis*	*500 ewes*	*3 lambs*	0	3
30	PT	08/83	*Mr. Robert Fink*	*150 swine*	*8 piglets*	3	0
31	RP	08/83	*Mr. Bob Carlson*	*300 ewes*	*20 lambs*	7	2
33	RP	09/83	*Mr. Raymond Kulhman*	*500 ewes*	*7 lambs*	0	1
	RP	09/83	*Mr. Raymond Kulhman*		*12 ewes*	0	
34	CY	09/83	*Mr. Arlan Sump*	*100 calves*	*1 calf*	0	2
						0	1

Established values: Chickens, $2.00 ea.: Calves, $100.00 ea.: Piglets, $15.00 ea.; Ewes, $50.00 ea.; Lambs, $40.00 ea.; and Cows, $400.00 ea.

tion of opportunities for the coyotes, and that in some situations there is less opportunity than in others. When there are no restrictions on the supply of easy prey (sheep) and no known way to control coyote populations, then it seems reasonable that sheep need protection from coyotes. I believe that every successful coyote damage control program will have to have a part that is devoted to preventive management education.

A feature of the Kansas program is the encouragement of the use of livestock husbandry methods that avoid coyote losses. We advise producers not to "set a table" for coyotes. Since coyotes are active mostly at night, sheep producers in Kansas generally pen their sheep at night. In Kansas, this cuts losses by around 90%, especially if a light is present over the penned sheep. We advise producers to count their lambs frequently, because coyotes can carry lambs away and not leave

any sign. Counting lambs and not letting lambs go to pasture is important.

In this past year, two producers who requested advice decided not to pen their sheep at night. One of these producers had 8000 feeder lambs in several flocks located in irrigated corn fields. Altogether he lost 250 lambs despite the removal of 26 coyotes. This year he has installed electric fences and so far has not had any losses from coyotes. In previous years, he did not have any large losses, as he practiced penning his sheep at night. The other producer only lost sheep when they were not penned. Some producers contend that penning sheep at night and a variety of other efforts are costly. But upon close and careful study of the alternatives, such efforts may be far better and less expensive than efforts to remove all coyotes.

We encourage the burning or deep burial of dead sheep. We encourage the use of electric fencing. We have prepared and distributed a booklet entitled "Managing Predator Problems" (Boggess et al. 1980). This booklet describes ways of avoiding coyote losses and is based on a study (Robel et al. 1981) to determine the relationship between sheep husbandry methods and coyote losses in Kansas.

We have held electric fencing schools and cooperated in research of producer's use of these fences. One study showed that 68% of the producers interviewed rated their electric fences very effective for controlling predators (Linhart et al. 1980).

We encourage other preventive management methods that include: use of guard dogs, propane exploders, recordings, trucks parked in pastures, and bells on sheep.

Another feature of our coyote damage control program is that we train volunteers to assist producers who request help of locally trained volunteers. In most cases these volunteers are coyote hunters with many years experience. Coyote hunting has long been a winter past-time in Kansas. These volunteers attended an Extension sponsored school where they were trained, certified and given an individually numbered billfold-sized card. These cards are signed by the County Extension Agricultural Agent and by the card holder. This program is approved by the County Extension Director on a county-by-county basis When coyote problems occur in a county that has adopted this program, many producers opt to have a local volunteer catch the coyote. We have around 500 volunteers.

We have special Kansas Coyote Hunter Awards that are presented to what we call "card carrying coyote hunters" who do outstanding jobs of helping others to reduce coyote losses. This part of our program has been especially helpful in promoting good landowner/sportsmen relationships.

We conduct coyote trapping schools, camps and workshops. These are well attended. While we mainly teach coyote trapping, we also teach other fur harvesting methods. In this past winter, 1982-83, approximately 36,000 coyotes were harvested in Kansas for their pelts. These pelts sold for about an average of $17.00 each. This amounted to slightly over $600,000 collected by coyote hunters and trappers (Fox, pers. comm. 1983).

In closing I'd like to state that the Kansas program in coyote damage control is not perfect and we are continuing to improve the results of the program. For those of you who are considering establishing a coyote damage control program in your state or province, my best advise would be to develop a self help and service combination program. Limit the service to situations where the person who is experiencing the problem has lived up to his or her responsibilities by not contributing to or directly causing the problem by disregarding reasonable preventive measures. And, second, after the person received training, that the person made reasonable effort to reduce the losses. Alberta, Canada has a program along these lines that is worthy of your consideration.

Thus, I believe that a reasonable approach would be to hope that people will develop a perception of coyote damage control as a partnership between the livestock producer and the people, where both have equal responsibility. The producers should recognize and accept the facts that their management of livestock can influence the occurrence of coyote damage. The people will need to realize the importance of coyote damage to individual livestock producers, show real concern, and not allow naive opinions to rule or dictate their decisions.

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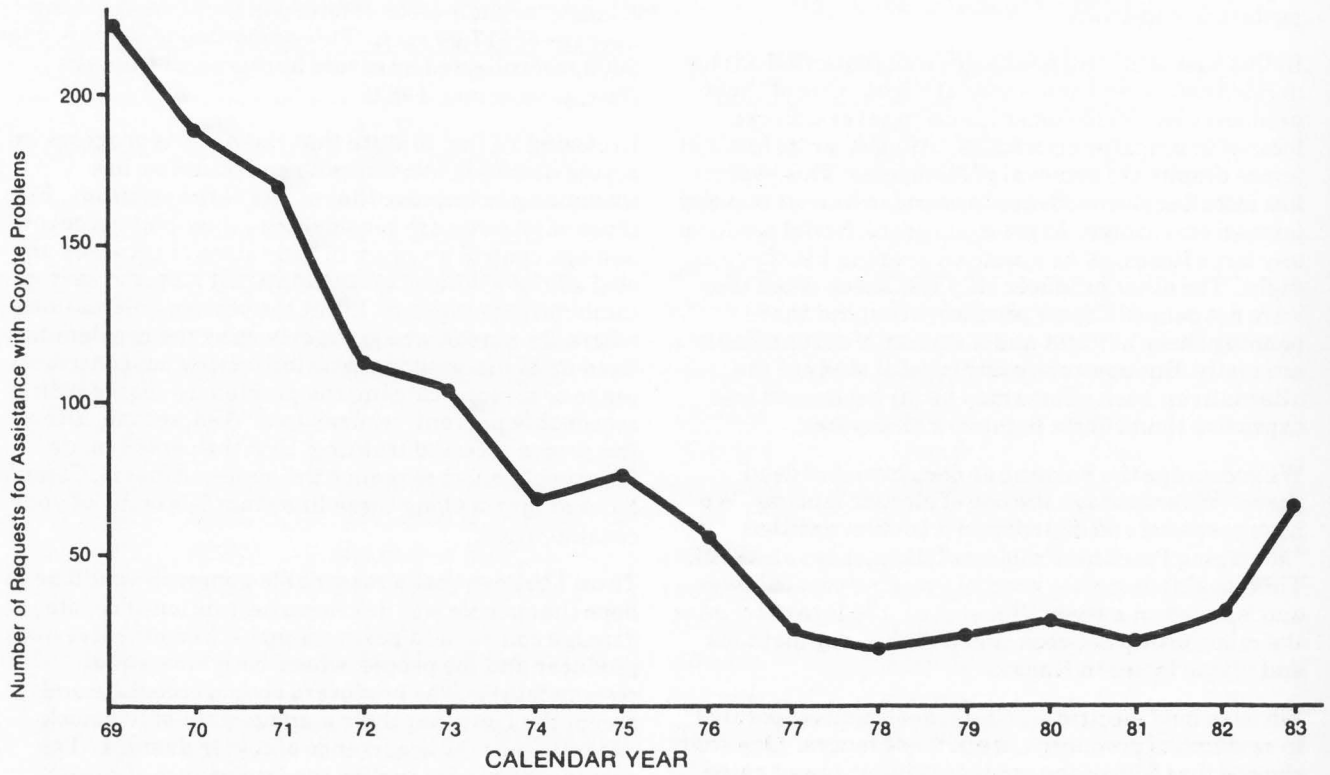

Figure 1. Annual number of requests for assistance with coyote problems received by Extension Wildlife Damage Control in Kansas, 1969-1983.

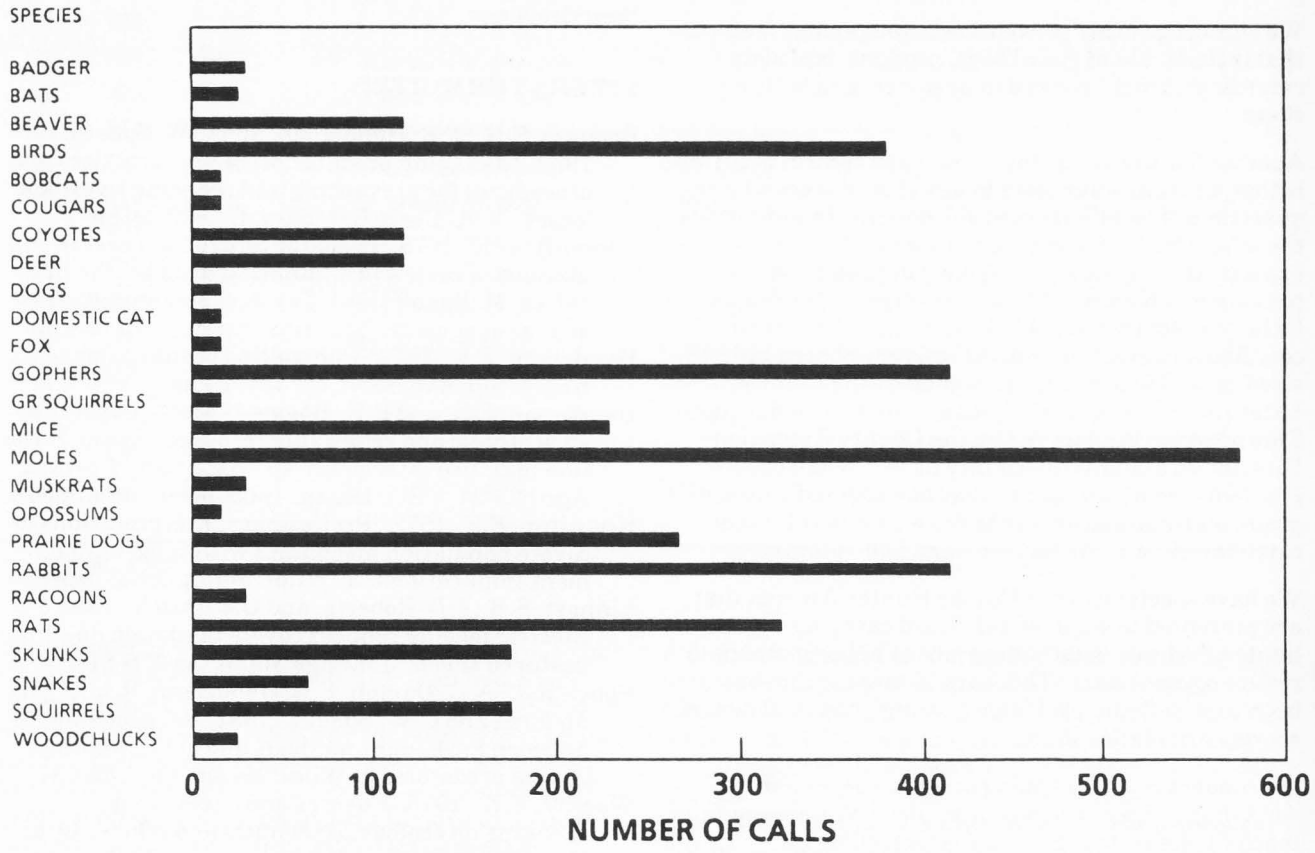

Figure 2. Wildlife damage reports in Kansas, October 1982 to June 1983.