Understanding The Coyote

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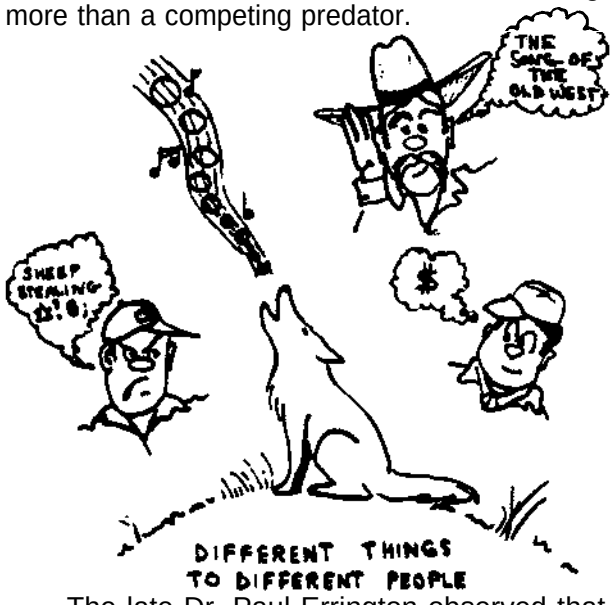
What Is A Predator?

A predator is any creature which gets some portion of its food by killing another animal. However, the concept means very different things to different people. Examples of predation include such everyday events as a swallow catching flies, a bass eating minnows, a quail catching grasshoppers and a man enjoying beef or chicken.

The sheep producer who sees a coyote kill one of his lambs is pretty certain that this particular coyote is a predator. The hunter who is fortunate enough to see a coyote catch and kill a rabbit knows that the coyote is a predator, too. In each case, the coyote has taken a creature which the man valued and perhaps desired for his own use. Often, we reserve the term "predator" for those animals which actually compete with man for prey animals.

There are many other people who view the coyote in quite a different light To many hunters, the coyote is a challenging quarry which gives many a thrilling chase. To people who simply enjoy nature, the coyote ranks as one of the most beautiful, intelligent creatures on earth. To many cattle ranchers, he is a symbol of the "Old West" and they enjoy listening to the yipping song of coyotes at sunrise and sunset. Fur trappers realize that the coyote can be a valuable furbearer. The eating habits of the coyote don't interfere with the enterprises of these men and so, to them, he is something more than a competing predator.



The late Dr. Paul Errington observed that people often confuse the fact of predation with the effects of predation. Few actual incidents of predation are actually witnessed by man. When predation is observed, it usually makes a vivid impression on the observer. Most of us have difficulty rationalizing the idea that a destructive act can be anything but detrimental to the prey animals. Thus, the careful observer who is lucky enough to actually witness the act of predation in the wild often comes away with the impression that the predators are decimating their prey.

We have used coyotes as an example in the paragraphs above because there are so many emotional prejudices about them. Equally diverse views are held about many other predators. The views differ, according to our personal experiences.

Like most predators, coyotes are opportunists. Individuals differ in what they eat and in how they act. Leaving morals out of it, individual animals vary in habits and actions just as humans do. Some are desirable to have around, others are hardly noticed and still others are downright bothersome. It makes no more sense to manage all of the Individuals of a species in the same way than it would to treat all people in the same way.

Killing predators or modifying the environment in order to control damages sometimes becomes necessary, but it is even more important to remember that most natural predators are valuable to us. Predation is one of the fundamental natural laws. Like all natural laws, we can work with it to our advantage; working entirely against it can bring environmental disaster.

How is predation important to us? First and foremost, it is a natural counterbalance to the great reproductive capacity of most prey species. Another natural counterbalance exists in the form of competition between predators themselves. A given area can support only so many of each different type of predator. When the numbers of any one kind of predator are unnaturally decreased, other kinds of predators tend to increase and fill the gap.

There is another way in which predation is important to us. It is often nature's way of eliminating weak, stupid, stunted, and diseased creatures in all wild species. Sick animals or those of poor quality are of little value to man. A few of their diseases (for example, tularemia or rabies) can infect man or his livestock. Yet, through predation, many unfit animals are killed before they can breed. Many diseased animals die before they can spread disease as much as they might otherwise. When such a "culling" process occurs, the deaths are not a waste because more food becomes available for those that are fit, strong and (perhaps) valuable to us.

This is the real meaning of predation. In nature, it is the normal and necessary working of a basic law that ultimately benefits all life, including man.

Understanding Is Important

The important thing to remember is that only by understanding and working with normal predation can we control the damage that results when predation is not normal. There are two ways of doing this: we can avoid predator damage by providing livestock protection from predators. When this is not enough, we can reduce predator damage by removing the individual predators that are causing damage.

Avoiding predator damage is by far the better plan. We can achieve this through good land use, livestock protection, and control of our own tame predators—the domestic dogs and cats. Employing all three of these together is often necessary because no one alone is certain to do the job. When we use land so that cover and food for valuable wildlife are preserved rather than destroyed, wildlife is more abundant. Then, predators can obtain enough food by harvesting the surplus and less fit individuals of wild prey species. Through the use of barns, poultry houses, fences, and trained dogs, man can protect livestock from predators. This is "insurance" that few producers can afford to be without.

The best way to reduce predator damage that we cannot otherwise avoid is to remove the individual animal that is causing the damage. The producer has the right to destroy any predator that is molesting his flocks or herds. If he does not know how, his County Extension Agent will help him learn how, with assistance from the specialist provided by the State Extension Service.

It is important to realize that the damage can be stopped only by removal of the particular predator that is causing it. When one gray fox is raiding a chicken-house, it's that fox that must be removed to save the chickens, not the ones that aren't bothering anything. When a coyote is killing lambs, it is that particular coyote that must be removed to save remaining lambs, and not the ones digging out mice over in the back woodlot. We've got to correct the idea that every fox, or coyote, or hawk, or what have you, is just waiting for the chance to wreak havoc in our flocks and herds. For the most part, predators prey on wild species. Normally, they avoid man and his domestic creatures. It is the exception and not the rule when a native predator makes his living by preying on domestic stock. When such an individual is removed, the damage almost always stops and predation resumes its normal course in the wild, where it is needed.

Predation

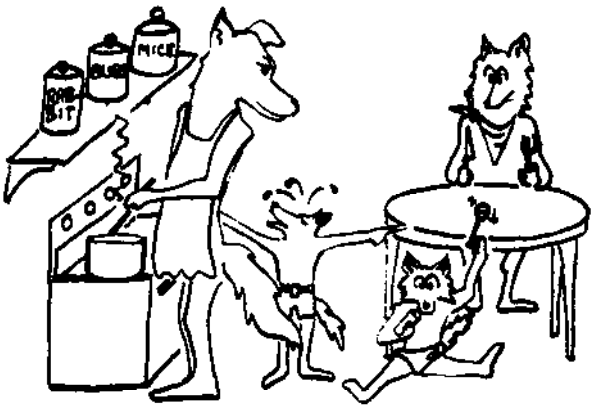
Let's take a closer look at the act of predation—one animal preying on another.

There is a tendency on the part of many people to classify all predatory creatures as wild, savage and dangerous. It is difficult to understand how this idea has become so en-

trenched because the two most coddled and common household pets, the cat and the dog, are both very definitely predators. The quiet, affectionate nature of these animals toward their human companions is well known. The gentle, purring "kitty," curled upon the cushion, has a dual personality and can be a ferocious predator indeed to small birds and mice. So too, the dog that romps with the children, however good natured, can be a keen and eager hunter and even a fierce and dangerous killer, if sufficiently aroused. With such familiar "domestic" animals, these complex behavior patterns are so commomplace they are taken for granted. What is not so well known is that these same qualities have evolved in nearly all predatory animals. This dual nature is natural and essential to the survival of nearly all predators.

The adults of higher predators, whether bird or mammal, have become so efficient in securing food that they often have a good deal of time to themselves, particularly during that part of the year when they are not tending young. Most predators are creatures of high energy and intelligence, and develop a considerable range of activities that lie outside the basic behavior patterns connected with feeding and reproduction. With mammals, many of these activities are well-known. Scientists who study animal behavior have described various forms of play, roughhousing and mock-fighting among predators.

The coyote is no exception in this regard, and behavioral scientists have repeatedly observed a variety of "play behaviors" in free-ranging populations of animals. Coyotes have been observed running as if playing tag, howling at the moon, carrying various objects around with them while running from another coyote, ambushing and attacking a playmate or provoking a playful fight. In addition to the play behavior outlined above, coyotes have the ability to recognize other individuals and to form bonds of individual acquaintanceship, not only with other coyotes, but (under certain circumstances) with human beings as well. The coyote has the ability to develop the same fondness for human companionship which is characteristic of the domestic dog.



PREDATORS DO NOT HUNT ONLY FOR THEMSELVES

The Savage Side

Now, with the foregoing in mind, we can look more objectively at the "savage" side of the nature of predatory animals. The behavior patterns are really quite familiar. Most are commonplace and may be readily observed in both the domestic cat and dog. We often overlook the fact that both these domestic animals, no matter how well fed, definitely enjoy hunting. if given the opportunity, both will hunt and kill for reasons that obviously have nothing whatsoever to do with hunger. Hunting excitement can be aroused to a high pitch by the scent or sight of some species but not by others. The actions of a hunting animal, even when engaged in killing something, are not "savage" and "fierce." A predator does not kill in a fighting rage, but rather in a spirit of alert, high excitement. This "enjoyment" of hunting, readily seen in the cat and dog, is characteristic of all the higher predators, including coyotes.

Again, the reason predators have evolved this desire or will to hunt and kill certain prey species is not difficult to understand. An individual may kill in excess of its own needs out of necessity to care for the young. Parents of all higher predators must hunt and kill far in excess of their own needs, and quite independent of their own hunger, to feed their offspring.

Domestic cats will take to hunting mice and small birds ("natural" prey items for them) with no prior instruction. These prey species are just the right size and have the right behaviors to cause the cat to focus its attention on them. Scientists who study animal behavior have shown that the innate catching and killing behavior of cats is actually unsuited to catching and killing birds. Nonetheless, most cats will hunt birds enthusiastically and some will learn to modify their innate behavior patterns so as to become very successful at this. The behavior patterns of cats are more suited to hunting and killing mice, and most cats can become successful "mousers" merely by honing and refining behaviors which they already have. Around farms and other areas which have an abundance of mice, cats are able to catch and kill mice readily and satisfy their hunger very quickly. However, most people have seen cats which are no longer hungry which continue to catch mice and "toy" with them, releasing them and pouncing on them repeatedly. This, too, is the result of the way in which nature has designed the cat to succeed as a predator.

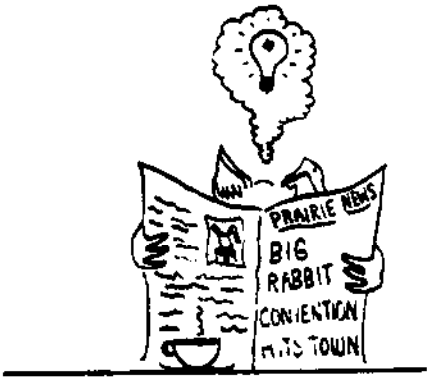
Getting Enough to Eat

In the everyday activities of a predator trying to make a living in a natural community, time and energy must be budgeted so as to ensure that the predator will obtain enough food to meet his requirements for energy and nutrients. This requires several different types of activity: hunting to locate prey animals, stalking (or coursing, in many canine predators) to get close enough to actually catch the prey, pouncing or attacking, killing and eating. Obviously, a predator in a natural community will need to spend a lot of time hunting at some times, as prey will not be evenly distributed throughout the community. When prey animals are encountered, they must be stalked or chased, and many of these attempts will be unsuccessful. When this happens, the predator has to be "ready" to begin hunting anew and to stalk and chase when prey is encountered again.

When a stalk or chase is successful (when the predator has put himself within striking distance of the prey), he still must attack or pounce on the prey animal. At this point, the prey may also escape, so that the sequence of hunting, stalking, etc. may have to begin again. However, when successful contact is made, the predator still must kill, and some prey animals may escape with their lives at this stage as well, particularly those attacked by young or inexperienced predators. Many prey animals fight back when attacked and some are able to successfully repel or escape predators at this point. However, once a kill is made, a predator is not completely assured of being able to put the prey to his own use. He may be displaced by a bigger, more aggressive predator which desires his prey, particularly if he is a young animal. So even successful killing is no guarantee that a predator will actually obtain the food which he needs to ensure his survial

However, nature has provided for predators. In the hypothetical sequence which we have outlined above, a predator would need to be motivated to spend more time actually hunting than stalking or coursing. He would need to spend more time stalking or coursing than pouncing or attacking. He would need to spend more time attacking than killing, and so on. Scientists have discovered that most predators possess what they call "action-specific energy" for many behaviors. This simply means that the desire to perform certain behaviors builds up within the animal and they will continue to perform certain activities (such as hunting, catching, killing, etc.) until the action specific energy for that behavior has been used up. This is why a cat will hunt birds, even though he may be well fed at the house. This is the reason that a cat will toy with a mouse, releasing it and recatching it repeatedly. Predators whose needs are satisfied with little expenditure of energy in the behaviors associated with obtaining food, will continue to perform many of these behaviors in the absence of hunger.

in addition to being deliberate hunters, predators are also opportunists. Nature has seen to it that predators are always ready to seize an opportunity and exert themselves the minute they see a really good chance to catch something.



PREDATORS ARE OPPORTUNISTS

From the foregoing, you might suppose that predation is a complex process. This certainly seems to be the case. Predators live at

the top of the food chain in an ecological comunity. They must be mobile opportunists who take every opportunity presented by nature, in addition to being methodical hunters. At times however, predators can be quite selective, focusing their attentions on animals which are sick, wounded or abnormal; but at other times, perfectly healthy animals may be taken. Normal predation involves much more than the elimination of the unfit prey wild animals, although where wounded or crippled prey is abundant, the attention of the predators maybe concentrated on such animals until they are eliminated.

Predation is never entirely random. There are always elements of selectivity and opportunity which are at work. The prey, in a sense, selects itself. Sheep producers often point out that coyotes take the strongest lamb, not the weakest. In fact, this is usually the case. Weak lambs are often in the center of a group of lambs, while the strong lamb is on the outside and is more active. The coyote is attracted to the active animal on the fringe of the group, an easier prey choice.

Finally, a marked characteristic of almost all predators is a tendency (often amounting to an insistency) of launching an attack only at quarry that flees from them. This tendency becomes very pronounced as the quarry approaches the predator in size, or exceeds it. With large quarry, predators are usually very cautious and will often refuse to come to grips with such prey as long as it stands its ground and appears to be on the defensive. Once a ewe runs, an experienced coyote can kill a 150-pound ewe without difficulty.

These, of course, are calculated decisions, and real hunger can act as a powerful variable, forcing the predator to become involved in situations it normally would avoid such as preying on calves. Yet, as a rule, predators, while not minding a struggle, have no wish to get into a real fight.

The nature of predation, then, is one of opportunity coupled with selectivity. Coyotes will wait in a field being harvested, knowing full well that such activity often flushes rabbits and rodents. Prairie fires are also utilized by educated coyotes.

Now, if we have left the impression that the higher predators have an easy time of it, this should be corrected. Experienced adults at certain times of the year certainly have no difficulties, but inexperienced young may fare quite differently, even under identical conditions. It is no accident that the very time of year when hunting is easiest (in early summer) is the very time of year when the food requirements of the young meat-eaters are themselves highest. At this time, there are any number of blundering, innocent half-grown young of a wide range of wild prey species available to the hunters. The experienced adults, during such times of plenty and countless opportunities, do have things pretty easy. However, for young predators, selectivity of the sternest kind begins; a selectivity that is just as ruthless to the coyote as to their prey. The young coyotes feed on the young of the wild prey species and both grow up together. The clumsy, stupid, or lazy predator starves and is eliminated. Weak, crippled, blundering, or slow prey animals—those which are in anyway inefficient—are also eliminated. This adjustment is continuous, beginning anew each season and continuing throughout the adult life of both predator and wild prey to the end of their respective lives. The pressure is as much on one as it is on the other and demands ever higher standards of alertness, speed and efficiency on both sides.

Even though we might expect the predator to be at an advantage in this situation, mortality among wild predators, particularly in the first year of life, is surprisingly high. Just how high may be illustrated by comparing the average life expectancy of a coyote (usually less than 3 years at birth) with the maximum age attainable (probably about 14 in the wild and occasionally in excess of 20 years in captivity). The critical period for predators seems to be in the fall right after they are abandoned by the adults. Once they reach the spring of their second season, their chances of seeing additional winters are much improved.

In the preceding paragraphs we have alluded to instruction and experience as being essential to survival. There is ever-increasing

evidence that a good many of the behavior patterns of the predators are learned as opposed to being altogether instinctive.

BEHAVIOR PATTERNS MAY BE LEARNED AS WELL AS INSTINCTIVE.

Among the basic predatory instincts inherent in all the predators is a tendency to be drawn to movement; that is, to chase, and to kill. However, these innate behaviors are modified by learning. All predators have an absolutely amazing capacity for storing experience, especially successful experience, and an equally amazing ability for using that stored experience in new situations. The development of such an ability in a potentially long-lived creature obviously has a higher survival value than a very wide range of inflexible instinctive reactions.

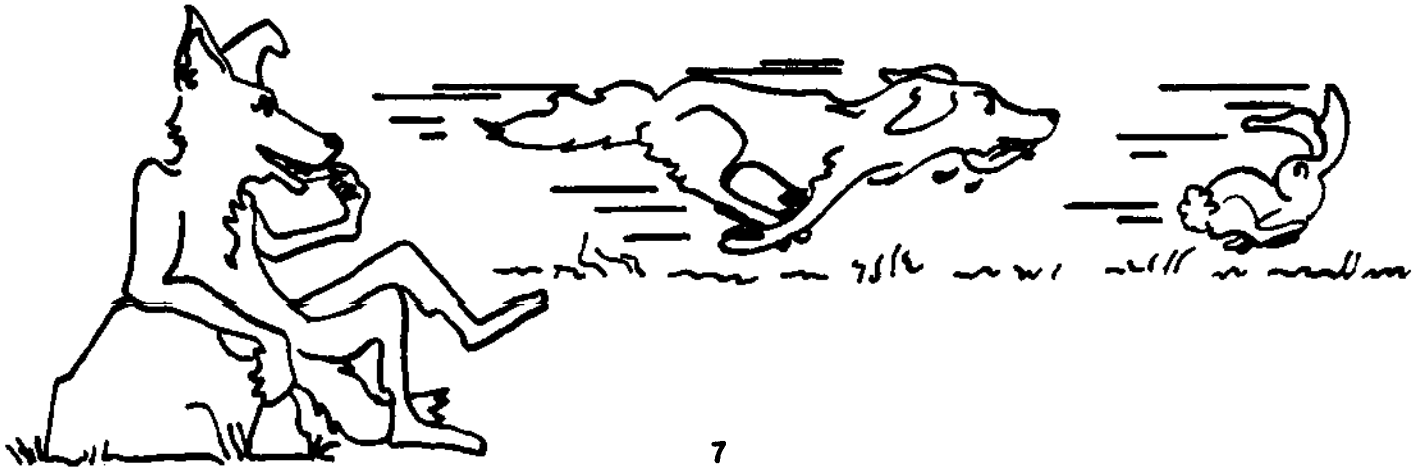
Adult predators "instruct" the young of the year by encouraging them first to chase, and then to take dead prey from the parents. Although we often think of the instinct to chase as being linked to the instinct to kill, in the higher predators the two actions become less closely associated, and at times are entirely disconnected. In dealing with any large, difficuit quarry the chase, capture, and killing are tasks of such magnitude that they engage the entire attention and energy of the predator. After a hard struggle of this kind, there is often a considerable period of time when the victor sits and rests before beginning to feed.

The acts of hunting and killing are, in all the higher predators, completed actions in their own right and not necessarily connected with feeding. All the predatory animals really enjoy hunting, but even more they enjoy the excitement associated with the experience of killing. Given the opportunity, most predators, once aroused, will kill repeatedly in what appears to be an insatiable blood-lust. The mustelids, mink, weasel, and ferret are best known for this, perhaps because they more frequently get themselves into situations where this characteristic can assert itself; but it is found in the other hunting animals as well. The behavior of dogs, when among sheep or enclosed poultry is exactly the same.

Once introduced to hunting, and after having made a few kills, many predators seem to find the experience so "gratifying" that it becomes dissociated with hunger and becomes an end in itself.

Predators Effect on Prey Members

There is a great deal of disagreement as to just how much affect predators actually have in limiting prey populations. Critics of the so-called "balance-of-nature" theory point out that many prey species undergo cyclic highs and lows despite the presence of predators, therefore, proving that predation cannot be controlling their numbers. However, most predators take prey in direct proportion to its availability. Predatory pressure is flexible and its major impact will shift between species or localities, depending upon relative availability of prey. With an increase in population densities, more and more density-dependent regulating factors (predation, competition, reproduction, emigration, disease) come into play. Even though predation may not always be the dominant factor reducing a prey population, it may serve to moderate peaks in prey abundance. A single species of predator could act as a moderating influence on several prey species simultaneously, switching its feeding behavior according to the availability of each. Therefore,



despite the fact that a prey species may continue to undergo cyclic highs and lows in the presence of a predator, it is incorrect to assume that the predator is having no affect on that prey population.

It is important to remember that an increase or decrease in the abundance of any one species produces changes in all other species. This principle applies to other species of **predators** as well as prey. There is evidence that when populations of one predator (such as the coyote) are reduced, populations of other species of predators in the area will tend to increase.

Reaction of Prey to Predator

Before closing this discussion, some notice should be taken of the reactions of various prey species to the presence of predators. Reactions of prey animals to predators range from aggressive defiance to a fear so complete as to be totally paralyzing. As a rule, the more nearly the prey animal approaches the size of the attacking predator, the more likely it is tempted to defend itself or at least fight to escape if caught. Where the size disparity is great, or when a quarry has exhausted itself in its efforts to escape, fear-paralysis may be observed. Quarry in a state of fear-paralysis can be taken in the hand, simply picked up, without its making the least effort at further attempts to escape.

The above reaction seems to be confined to species which are relatively defenseless. Usually these are species that constitute the normal prey for the predator concerned. However, the fear reaction is not always present in prey species. Species that do not normally constitute food for predators react to them in a very different way. Sheep not preyed upon by coyotes pay little attention to the presence of coyotes. Only when an attack is actually made do they show any real alarm. Even then, they often seem more surprised than afraid. In open areas, sheep do panic and usually manage to evade repeated attacks occurring at one time.

There are exceptions. Coyotes living in areas where better quality wild prey is scarce may take to feeding largely on some domestic livestock. There is also the odd individual of any predatory species that works out some special technique (probably by accident) of catching and killing some locally abundant domestic species that is normally not taken. Examples of this aberrant behavior are rather well known: "man eaters" in the large cats come to mind at once. Individual coyotes sometimes take to killing domestic dogs and cats. The occasional coyote becomes a confirmed chicken killer. Such individuals are often adult males. Sometimes, but not always, such individuals are very old or physically impaired in some way that acts as a handicap in the speed or coordination needed to take their normal wild prey.

Predators Preying on Other Predators

Interpredation, the attacking of one predator by another is rare in mammals. But coyotes do affect the numbers of other predators. We usually think of predators as eating the prey animals, but seldom do we consider the fact that all animals in a given area are "tied together." Predators are not only affected by prey, but predators are affected by other predators, within a given area. Some of these predators feed on each other; coyotes kill bobcats and fox; coyotes even kill other coyotes and there are records of foxes killing other foxes. There may also be a high degree of competition between predators for the available food. Coyotes keep populations of other kinds of smaller predators down because the coyotes are dominant predators, being the largest and most adaptable. After using poison baits in several areas, an employee of the U.S. Fish and Wildlife Service, Weldon B. Robinson, noted that the lesser predators increased enough to fill the gap left by the missing coyotes.

In South Dakota and North Dakota the red fox increased and spread into areas left vacant

by wide-spread poisoning of coyotes. This created a problem for sheepmen because there were three to five foxes present in areas where originally there had been only one coyote. Cases of confirmed lamb losses were reported for red fox. After thousands of dollars were spent in an attempt to extirpate the coyote, the people of South Dakota and North Dakota found themselves with a low coyote population and a high red fox population. Bobcats increased, too.

These, then, are some of various aspects of predation. it is a complex subject with many ramifications, and our knowledge on the subject though increasing, is still very limited.

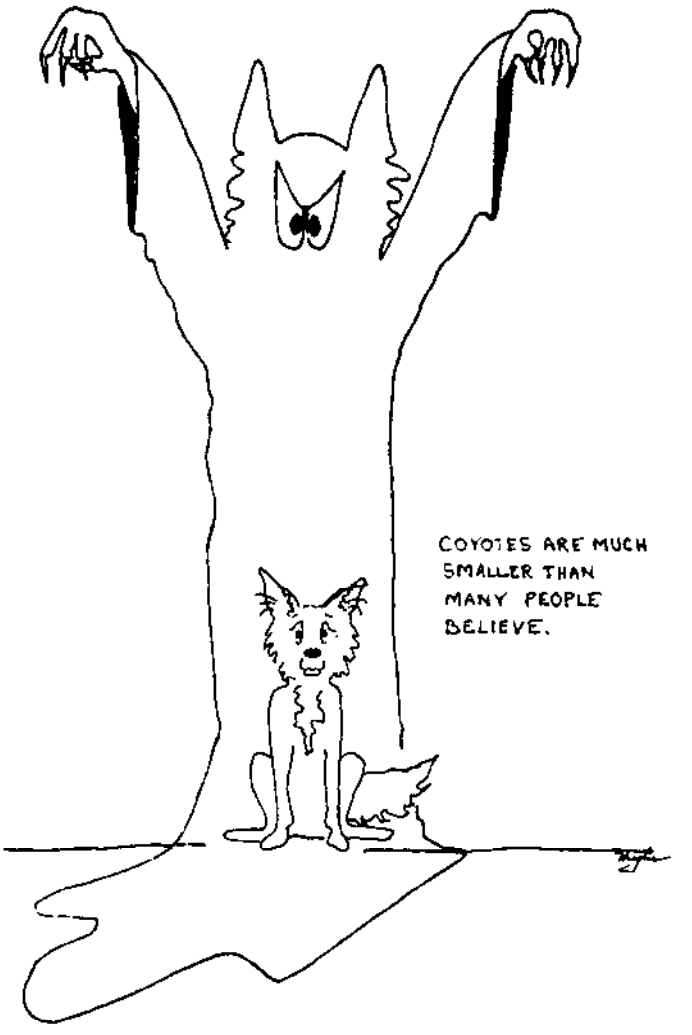
II. The Coyote

Coyotes are members of the dog family or Canidae and are much like dogs in many of their habits. The scientific name of the coyote, **Canis latrans** is Latin for "barking dog." The common name comes from the Aztec Indian word **coyoti** and was handed down by the Spaniards. Although the preferred pronunciation is the Mexican-Spanish version "ki-o-tee," the shortened "ki-ote" is commonly used. Coyotes are sometimes referred to as prairie or brush wolves. The true wolf or timber wolf, **Canis lupus,** was once found in Kansas, but has been extinct in the state since about 1905.

Coyotes are found throughout Kansas as wel as most of the North American continent. In recent years they have expanded their range into all of the United States. in Kansas, coyotes are most abundant in the eastern two-thirds of the state.

The coyote is a great deal smaller than many people believe, averaging about two feet high at the front shoulders. In Kansas, adult male coyotes average about 30 pounds while females average slightly smaller at 25 pounds. Coyotes in eastern Kansas average a couple of pounds heavier than western Kansas coyotes. An occasional extremely large coyote may approach 45 pounds.

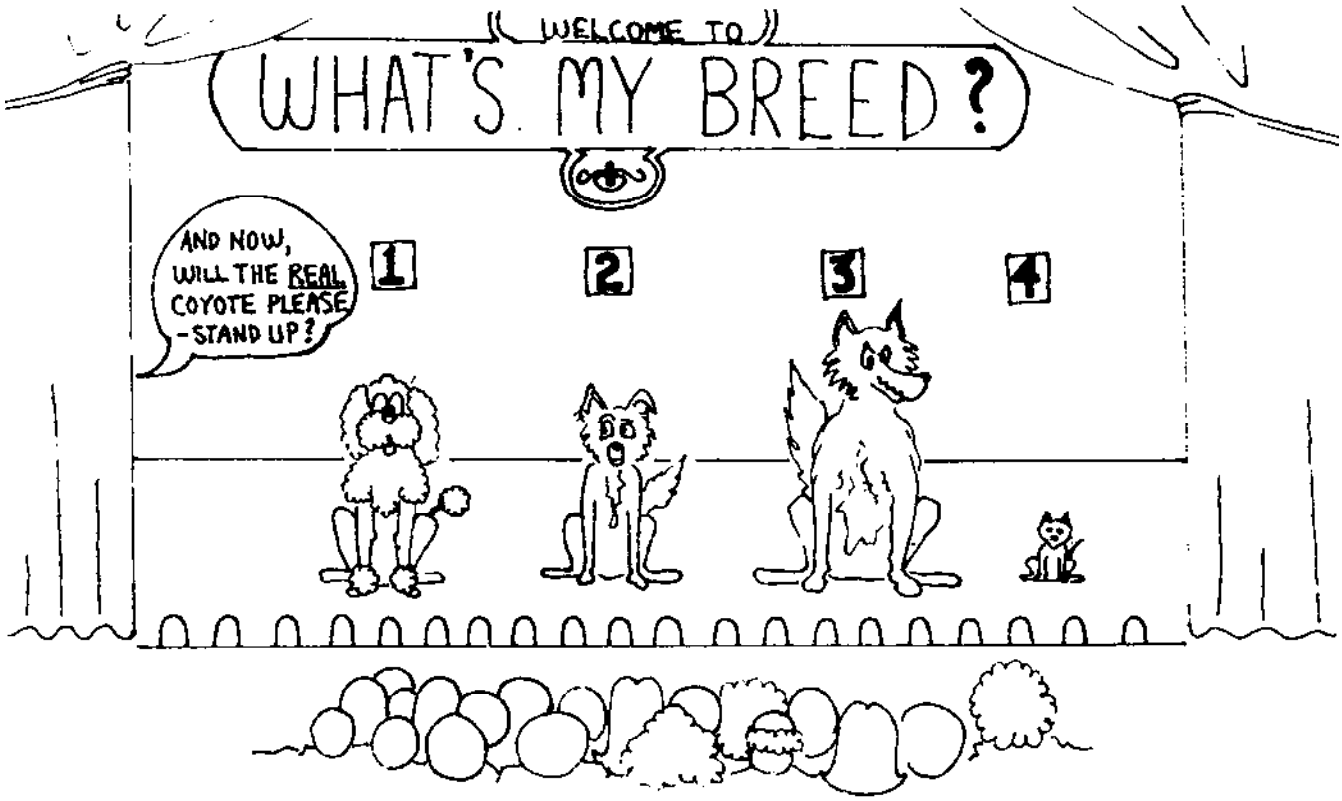
Coyotes are typically light gray to dull yellow, and particularly in eastern Kansas, often have somewhat of a reddish coloration. The outer hairs of the coyote's coat are broadly tipped with black. The throat and belly are white to pale gray and may also have a reddish coloration. There is, however, a great deal of variation in the natural color of coyotes in Kansas. The iris of the eye is a tawny yellow or pale gold and is characteristic of all coyotes.



Coyotes have a heavy winter coat which is shed in late spring and then is replaced gradually through the summer months. The fur is prime from November through February and is used extensively for trim on winter coats and parkas.

Different Kinds of Coyotes

There are 19 recognized subspecies of the coyote in North America, two of which are found in Kansas. The plains coyote, **Canis latrans latrans,** is found in the western two-thirds of Kansas and the south-eastern coyote, **Canis latrans frustror,** is found in the southeast and extreme eastern portions of the state. The southeastern subspecies is darker and more reddish than the pale plains subspecies and it has much more black down the front of the forelegs.



COYOTES ARE MEMBERS OF THE DOG FAMILY.

Do Coyotes Cross with Domestic Dogs?

Occasionally, coyotes have been known to cross with domestic dogs, forming a hybrid commonly known as a coydog. Coydogs are relatively rare in Kansas, but they are known to occur, particularly in more heavily populated areas where dogs are allowed to roam free. Often a coydog will be larger than either of its parents. Also, unlike many hybrids, the coydog is fertile and can reproduce. Characteristics which may indicate that an animal is a coydog are; weight more than 45 pounds; eye color other than pale gold; and black, red or spotted coloration. In most cases, expert identification is necessary to determine whether an animal is or is not a coydog. Very little is known about the distribution, abundance or behavior of coyote-dog crosses in Kansas.

Identification of hybrids is complicated by the fact that there is a great deal of natural color variation in coyote populations. Coloration ranges from extremely pale or almost white to nearly black or red. The most reliable method to identify hybrids is a detailed examination of the skull by an expert.

How Long Do Coyotes Live?

Coyotes have been known to live 14 years in the wild and up to 21 years in captivity, but the average life-span in the wild is much shorter than that. The average age of coyotes in a wild population is 2 to 3 years. This low average is due partially to the fact that a large proportion of the coyotes die before they ever reach 1 year of age. Mortality of coyotes may range from 40 percent in unhunted populations up to 60 or 70 percent in populations undergoing intense hunting pressure.

The Songs of the Coyote

Coyotes are perhaps best known for their howling or singing ability. They commonly give a series of yips, yaps and howls, often in concert with other coyotes. The coyote's voice has a ventriloqual quality and may carry for several miles. Two or three coyotes howling together create a bedlam that is often mistaken for ten or twenty. Coyotes are most often heard howling from about sunset until just after sunrise, but they can occasionally be heard during the day. Time of year has some effect on the frequency of howling, with a peak occurring during late summer and fall. Sometimes a train whistle or a siren will stimulate coyotes to howl, even during the middle of the day.

The Family Life of the Coyote

Coyotes probably do not mate for life, but are monogamous; that is, they will take only one mate in any given year. Breeding begins in

late January, reaches a peak by mid-February, and continues into early March. Individual female coyotes are only capable of breeding within a single period of 2 to 5 days once a year.

Usually, one-year-old females do not breed, but under some conditions they may. In some years fewer than 10 percent of the animals in this age group become sexually active, but in years when food is abundant and competition is low as many as 75 percent of the yearling females may breed. The percentage of the entire female coyote population capable of breeding has been shown to vary from about 30 to over 90 percent, depending on environmental and social conditions. Most of this variation appears to result from the frequency with which females become sexually mature in their first year of life and, to a lesser degree, from variations in the breeding capabilities of older coyotes.

The female coyote prepares the den in which the young will be born. She may dig her own den, but more often she will remodel an old badger burrow, or may use a hollow tree or a crevice in a rock pile. One female usually prepares or cleans out several den burrows before selecting the one in which to give birth to her pups. These extra dens maybe utilized at a future date if the original den is disturbed, or they may never be used. Sometimes the mother coyote will split the litter between several dens once they reach several weeks of age.

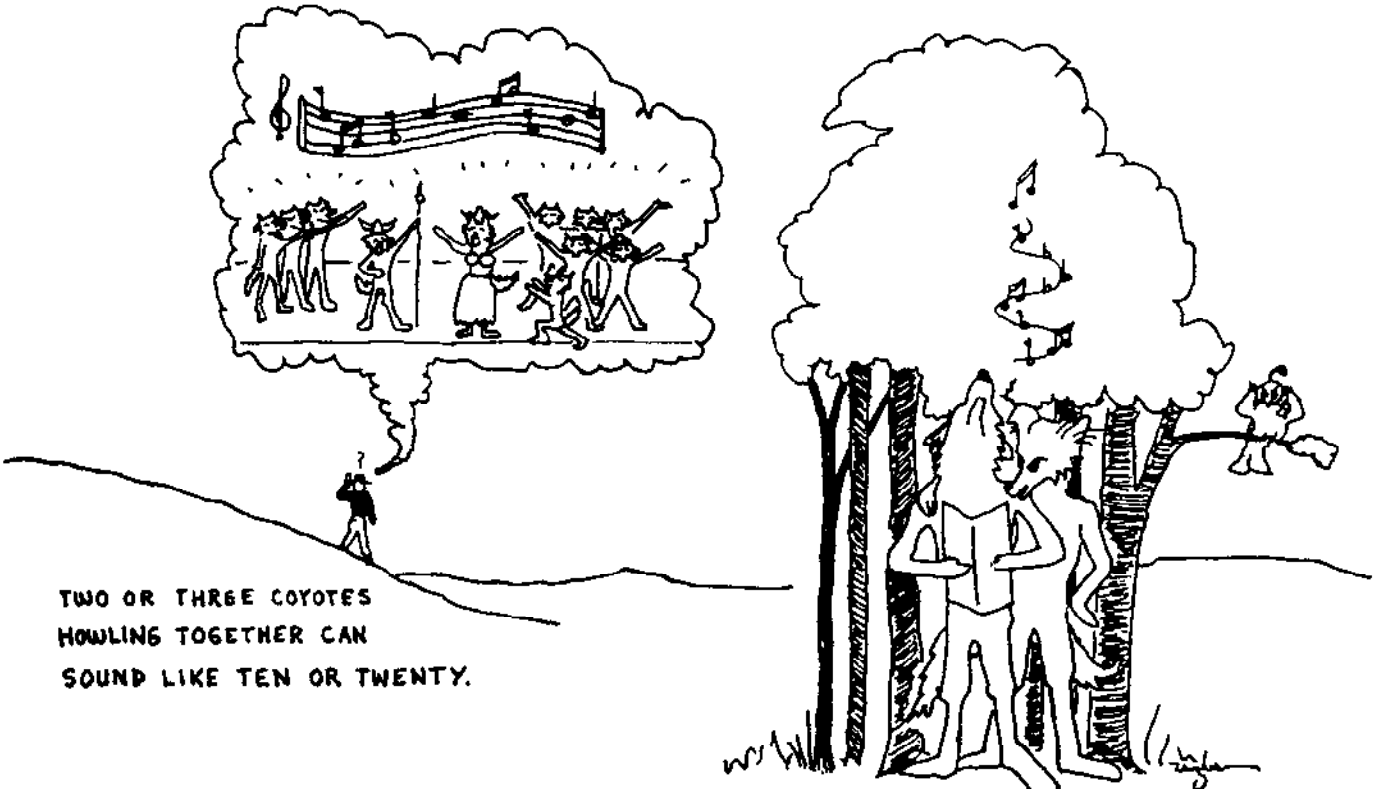
Gestation is about 63 days and the pups are born from early April through mid-May. They are blind and helpless at birth and are covered with brownish-gray woolly fur. The male coyote actively participates in raising the young and does most of the hunting for the female and her newborn pups.

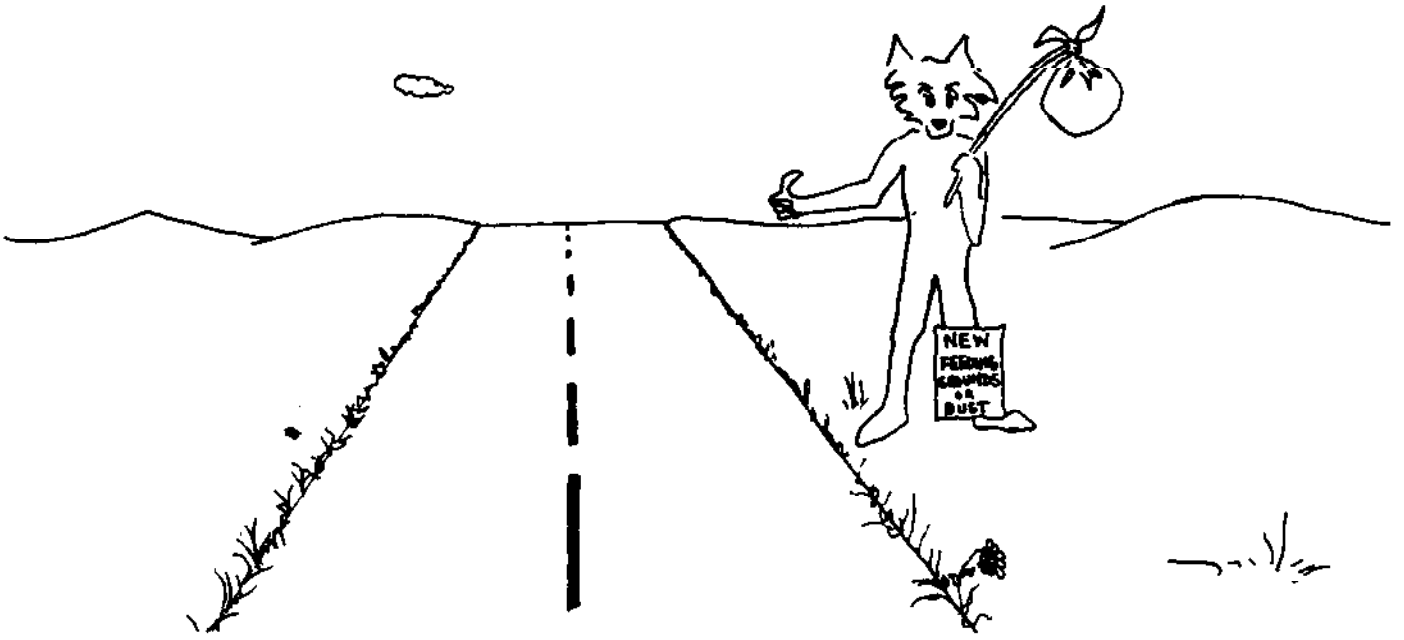
An average litter contains five to seven pups, but this may vary from only one up to a dozen or more in rare cases. A study conducted in Texas indicated that litter sizes may vary inversely with the coyote population density. Litter sizes in areas of high population density averaged 3 to 4 whereas in areas of low coyote numbers the average increased to as high as 9 per litter. Thus, in areas with low coyote numbers, the remaining animals responded by having larger litters.

Coyote pups first open their eyes at about 11 days of age, although some may open them as early as 8 days. Coyote pups can be distinguished from fox pups by the shape of the eye pupil; the pupils in strong light are round in coyote pups and are vertically elliptical in living red and gray fox pups.

The young first venture outside the den at about 3 weeks of age, but do not remain outside for long periods of time until they are about 5 or 6 weeks old. During the first few weeks after the pups are born, the male hunts while the female tends the pups. At weaning time (about 8 weeks of age) both parents bring food to the young in their stomachs and disgorge it outside the den. In contrast to the fox den, the outside of the coyote den is usually clean, with no large collection of bones or other carrion.

The coyote family usually moves out of the den sometime in June or early July. They maintain a center of activity throughout the summer and early fall which is characterized by flattened vegetation, worn areas and diggings. The pups are taught to hunt when they are 8 to 12 weeks old and, as the summer progresses, they begin to range over wider and wider areas. These loose family groups break up in the late fall when the young disperse.





Coyotes are thought to be territorial and apparently maintain their territories by scent-marking and (rarely) by actual fighting. Mature males establish a home range averaging 10 to 20 square miles in size. Females range over a smaller area (about 5 to 15 square miles), but their home ranges are more distinct and overlap much less than do those of males. Radio tracking studies have given us information on coyote territoriality that was never obtainable before. Our knowledge in this area remains scanty, however, the ongoing studies should provide us with even more information.

Beginning about November many of the young coyotes disperse, seeking territories of their own. This dispersal movement may be in any direction and the young coyote may end up as much as 100 miles or more from the den where it was born. The average distance moved is from 10 to 25 miles, but movements of 40 to 50 miles are not uncommon. Once dispersal has taken place, the coyote establishes a home range where it will probably remain for the rest of its life. Dispersal apparently takes place primarily among young coyotes in their first year of life.

How Many Coyotes are there in Kansas?

No one knows for sure, as there is no way to count all of the coyotes. Scientists have devised a method to determine the coyote density changes from year to year in an area, provided that the method is carried out precisely. The figures for Kansas have been complied on this density survey between 1972-1979 and the results are in Figure 1. The coyote population in Kansas seems to be more stable than in surrounding states. Again, as to what this density survey translates to in numbers of coyotes is not known. But, it has been estimated that the early summer coyote population in Kansas varies between 150,000 and 300,000 coyotes and that the late winter coyote population is between 80,000 and 150,000 coyotes.

Under very favorable conditions, population densities may reach five or six coyotes per square mile. But such densities would be unusual, occurring in a given area only for short periods of time. An average of about one coyote per square mile is normal over most of Kansas.

Coyotes are basically solitary animals and are usually found either alone or in pairs. Although groups of coyotes are sometimes seen, they are not true packs like those of wolves. Wolf packs are characterized by a high degree of social structure, organization and cooperation, particularly in hunting activities. Groups of coyotes may be found together in a variety of circumstances, but there is not the same degree of organization or cooperation as found among members of a wolf pack.

in the fall, coyotes may be seen in loose family groups, but these will gradually break up as winter progresses. Often in winter, groups of coyotes will be brought together by the presence of a concentrated source of food (such as a cattle carcass) in an area where other food is less available. Sometimes coyotes will be concentrated in small areas of good cover. This is particularly true in areas where hunting pressure is intense and suitable escape cover is in short supply. Finally, groups of coyotes may occasionally occur in the early spring during breeding season. Several males may be courting the same female simultaneously.

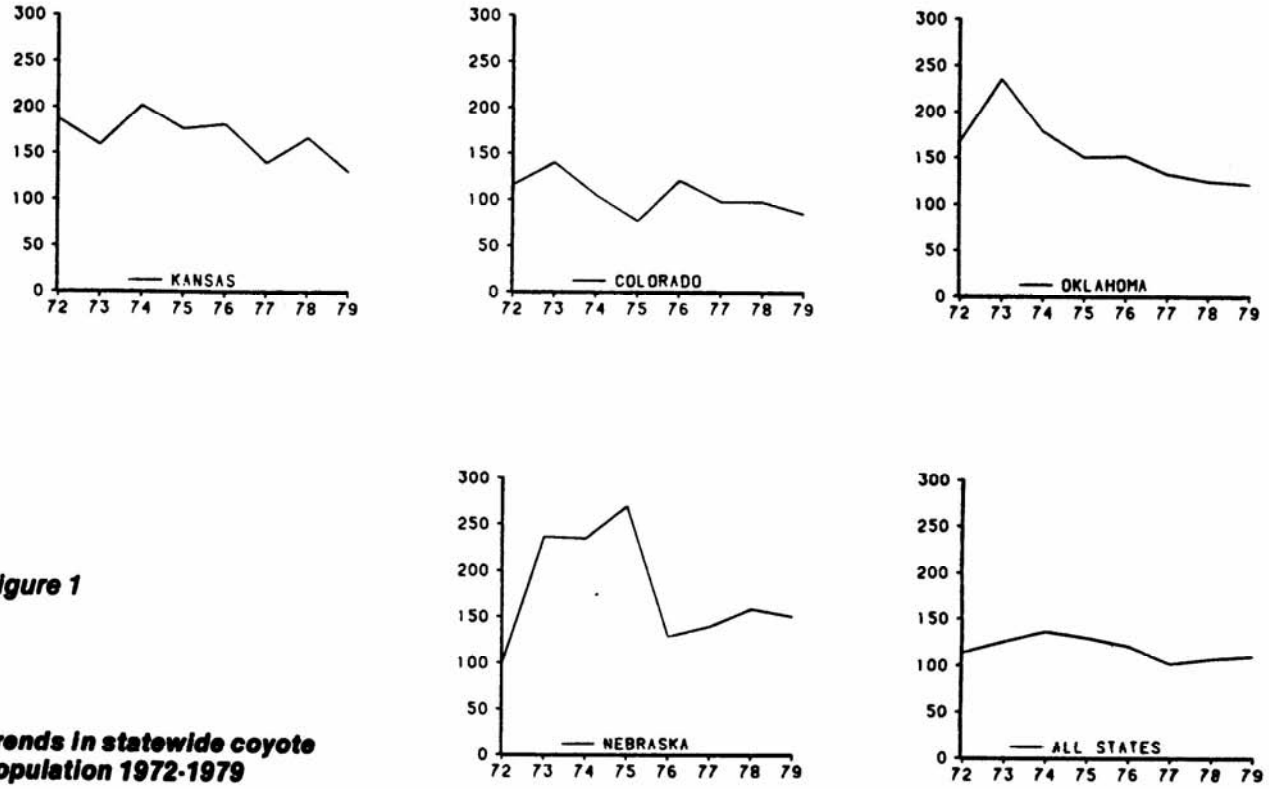
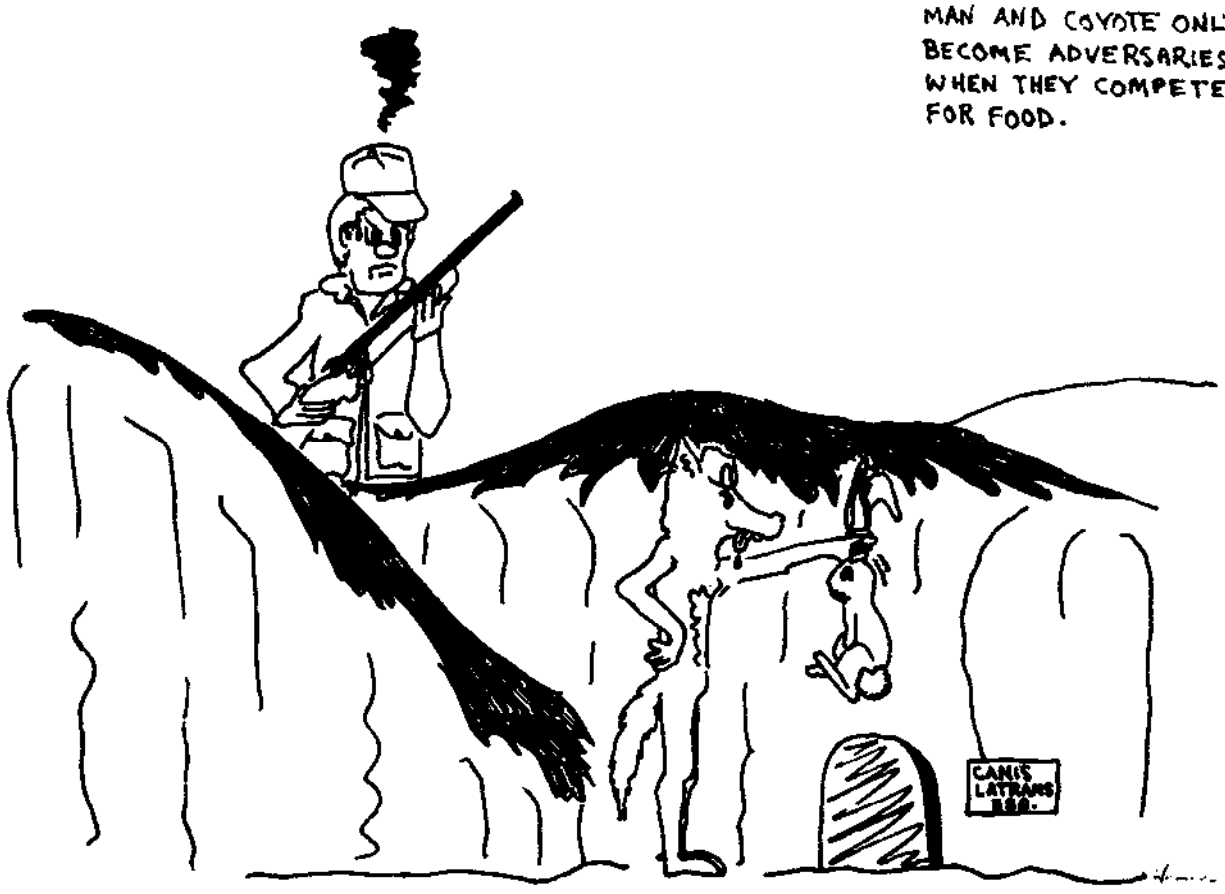


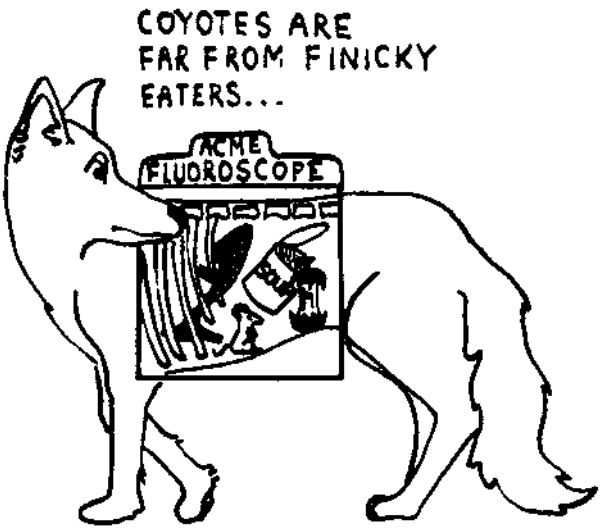
Figure 1

Trends in statewide coyote population 1972-1979



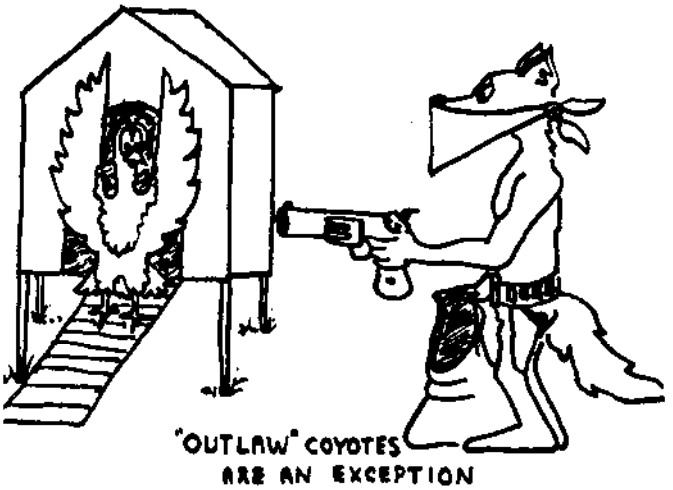
What Do Coyotes Eat?

Coyotes are far from being finicky eaters and will gulp down nearly anything digestible and some things that aren't. Although rodents and rabbits make up the bulk of their menu, coyotes are opportunists and take whatever food is easily obtainable. If the most available item happens to be an unprotected lamb or calf, coyotes may take advantage of the situation. On the other hand, coyotes also readily eat plant foods such as plums, mulberries, pears or watermelons, when they are available.

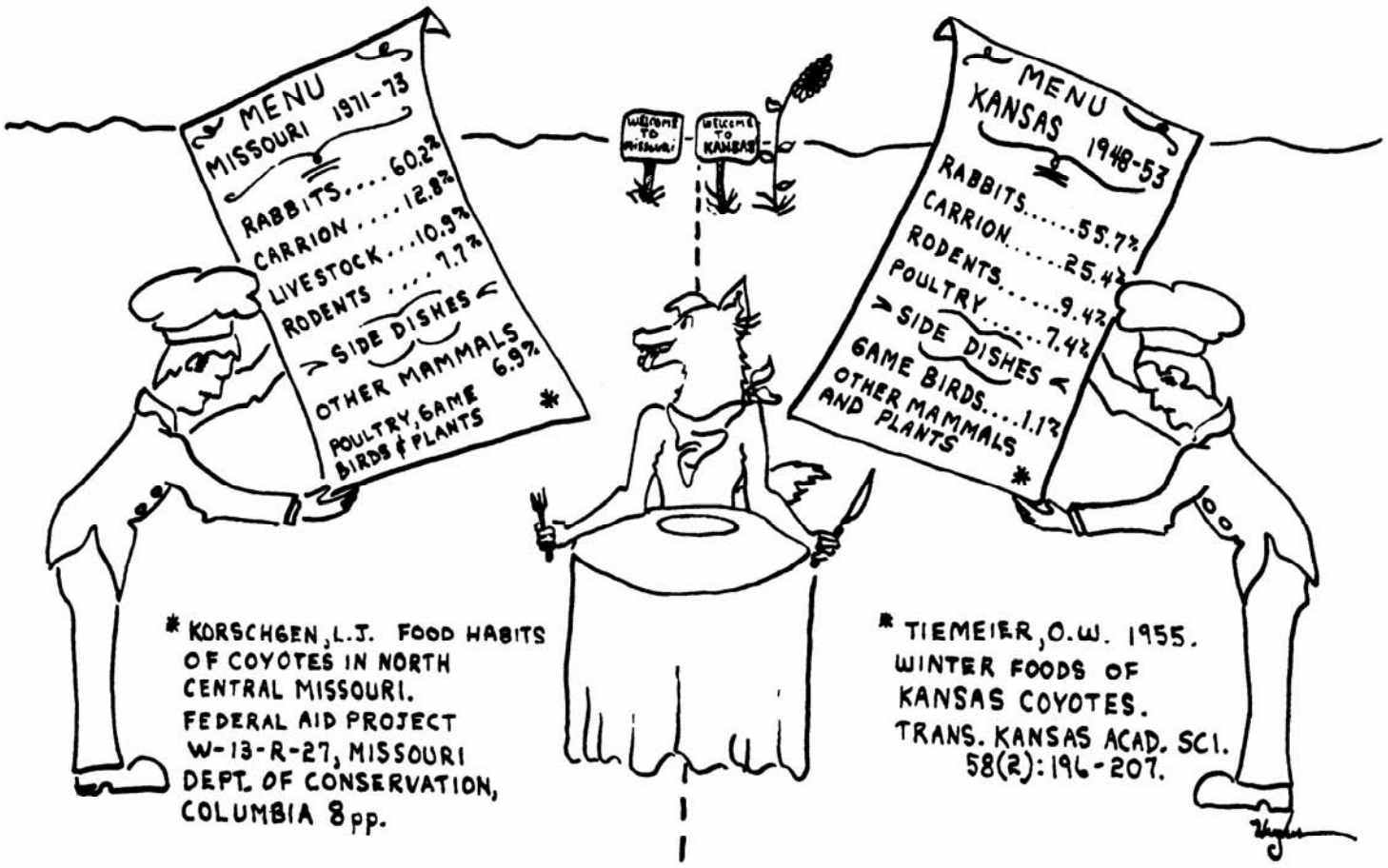


Most coyotes begin foraging just prior to sunset and continue for several hours after dark. They are again active, to a lesser extent, just before daylight. However, they may forage at any time of the night or day. While foraging and traveling from area to area, coyotes follow roads and trails. They also follow conspicuous features of the landscape such as ridges, draws, fencelines, field borders and windbreaks. A good rule of thumb is that a coyote will follow the easiest path through a particular area.

Coyotes and humans generally get along with few difficulties. It is only when coyotes eat something of value or something that belongs to man that they come to be regarded as adversaries. Numerous food habit studies have demonstrated that only a small proportion of the coyotes in any given area are livestock predators. This is small comfort to the stockman who may be losing animals to a problem predator. Nevertheless, we should attempt to keep our objectivity about predators. They are integral parts of most natural communities. It is no more fair to visit the sins of a few animals upon the many blameless ones in the population than it is to single out a segment of human society and blame it for the transgressions of a few of its members.



TWO SURVEYS OF COYOTE FOOD HABITS



* KORSCHGEN, L.J. FOOD HABITS OF COYOTES IN NORTH CENTRAL MISSOURI. FEDERAL AID PROJECT W-13-R-27, MISSOURI DEPT. OF CONSERVATION, COLUMBIA 8 pp.

* TIEMEIER, O.W. 1955. WINTER FOODS OF KANSAS COYOTES. TRANS. KANSAS ACAD. SCI. 58(2): 196-207.

III. Coyote Damage Control In Kansas

Since the State of Kansas was founded, virtually every coyote control method known to man has been tried.

Bounties

Payment of bounties was the first way in which Kansas attempted to control predators. These bounties were started in 1877. After 93 years of bounty payments, the results have been overwhelmingly consistent and conclusive. The bounty system does not control predators or predator damage to poultry and livestock. Payment of bounties was discontinued in Kansas in 1970.

A major weakness of the bounty system is that it is self-regulating. When predators are abundant, they are hunted heavily and many are killed, but when they are scarce the hunting effort and enthusiasm for hunting decline. Thus the bounty system goes on year after year, yielding a small harvest when the population is low and a large harvest when the population is high. The same is true even when a higher than average bounty payment is made and professional bounty hunters take large numbers of animals. These professionals work areas only where the population is high. When an increased amount of effort is required to harvest animals in profitable numbers, the bounty hunter moves to "greener pastures" and actually leaves behind a healthier predator population. Reducing the numbers of predators makes it easier for the remaining predators to survive the winter and come through in better shape. In spring larger litters are born and the next fall the predator population is about where it was before the bounty hunter entered the area. Continued high prices paid for coyotes, causes repeated high harvest, and coupled with a low cycle in coyote numbers could cause a reduction in total coyote population. But it is doubtful that the reduction could be drastic enough and maintained for sufficient time to theaten the coyote's existence.

Are Coyotes Population Cyclic?

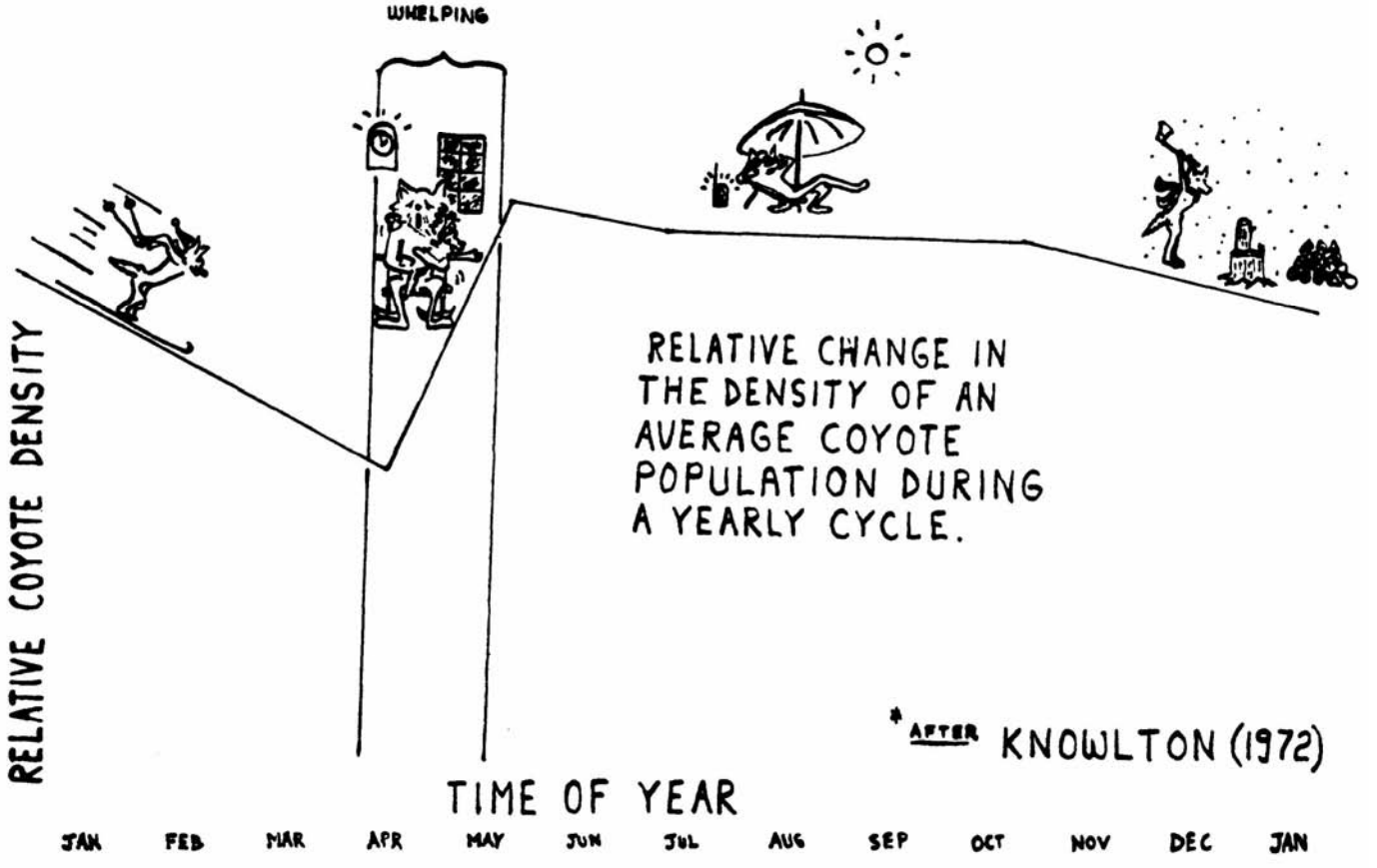
Evidence seem to suggest that most wild animal populations in the Temperate Region (of which Kansas is a part) have experienced a series of increases extending over a period several years followed by an abrupt decrease. Also populations of one kind of animal may be high in one part of the state while in another part, the same kind of animal population would be low. Some persons believe such changes are "cyclic" and maintain that every 10 years or so, the population peaks. Coyotes are a good example of an animal with periodic "booms" and "busts." In peak years (boom years) a person might find three coyotes where several years before only one coyote could be found. Animal populations in the Temperate Region do fluctuate over a period of years, but the conditions which trigger increases and decreases do not always occur at regularly spaced times nor in the right combinations necessary to produce true cyclic changes. The "ups" and "downs" occur at different and unpredictable intervals and consequently are not truly cyclic.

Poison Baits

In addition to the payment of bounties, another way that people in Kansas have tried to reduce the predator population was through the use of poison baits. This sounds like a good idea and would seem to be an easy to use method, but known methods of baiting have not proven to be either effective or selective.

When poisons are used in a population control attempt, many problems develop. Some

people feel that attempts to poison coyotes produce a new "breed" of coyote. It is possible that the sustained use of poison baits attracts those coyotes most apt to feed on carrion. Coyotes which have a natural tendency to hunt and kill their own food are less affected by these poisoning programs, resulting in gradual selection for coyotes more inclined to kill than to eat carrion. Such genetic selectivity has been known to occur in populations of insects treated with pesticides and in disease organisms treated with various antibiotic agents. However, coyotes are much longer-lived than insects or bacteria and genetic selection in coyotes would be almost imperceptibly slow. However in a species such as the coyote, where many behavior patterns are learned rather than inherited, those learned behavior patterns could be changed in a single generation. Some coyotes also undoubtedly get sublethal doses of poison bait and recover after being agonizingly sick. Thereafter those coyotes may turn to livestock when short of natural, live food, rather than feeding on carrion. If these suppositions hold true, poisoning could actually worsen a livestock depredation problem after a period of sustained use. Although these ideas have often been suggested, they have yet to be proven one way or another.



Difficult to Eradicate Coyotes

If we recall some of the points brought up in the preceding sections, we begin to realize just how difficult it would be to eradicate established populations of coyotes by any means. First of all, recall that the percentage of first-year females that breeds is highly dependent upon both food availability and on the general level of the population. Also recall that there is a great deal of variability in litter size, changing inversely with population density. Intensive control probably stimulates both of these regulators to result in greatly increased reproduction. That is, control which lowers coyote densities may stimulate breeding in a larger percentage of the remaining females and stimulate the production of larger litters.

During late fall and winter, nature takes a heavy toll of the young, inexperienced coyotes as they disperse and learn to fend for themselves. Research shows that annual mortality for coyotes one year and older may reach 40 percent in populations not undergoing trapping or intensive artificial control. Therefore, the high reproductive potential of coyotes under good conditions may mean that control efforts merely crop the population, taking the surplus normally lost to nature. For that reason, trapping for pelts during fall and early winter is successful, but population control attempts at that time are practically wasted effort. Nature is already effectively culling the population. A computer simulation study in California suggests that at least 75 percent of the coyote population must be removed each year before a sustained decline in the population can be achieved.

Control probably also stimulates immigration into the control area from more densely populated areas nearly. Remembering the extremes mobility that coyotes possess (over 100 miles in some cases), even if the entire State of Kansas was cleared of coyotes, they would be able to reinvade from other areas into the center of the state within one or two years.

Because of the coyote's opportunistic feeding habits, it is able to utilize a wide variety of food items and to survive under adverse conditions. The fact that only a small percentage of all coyotes eat livestock means that hit and miss control efforts will probably be less effective than trying to control problem individuals.

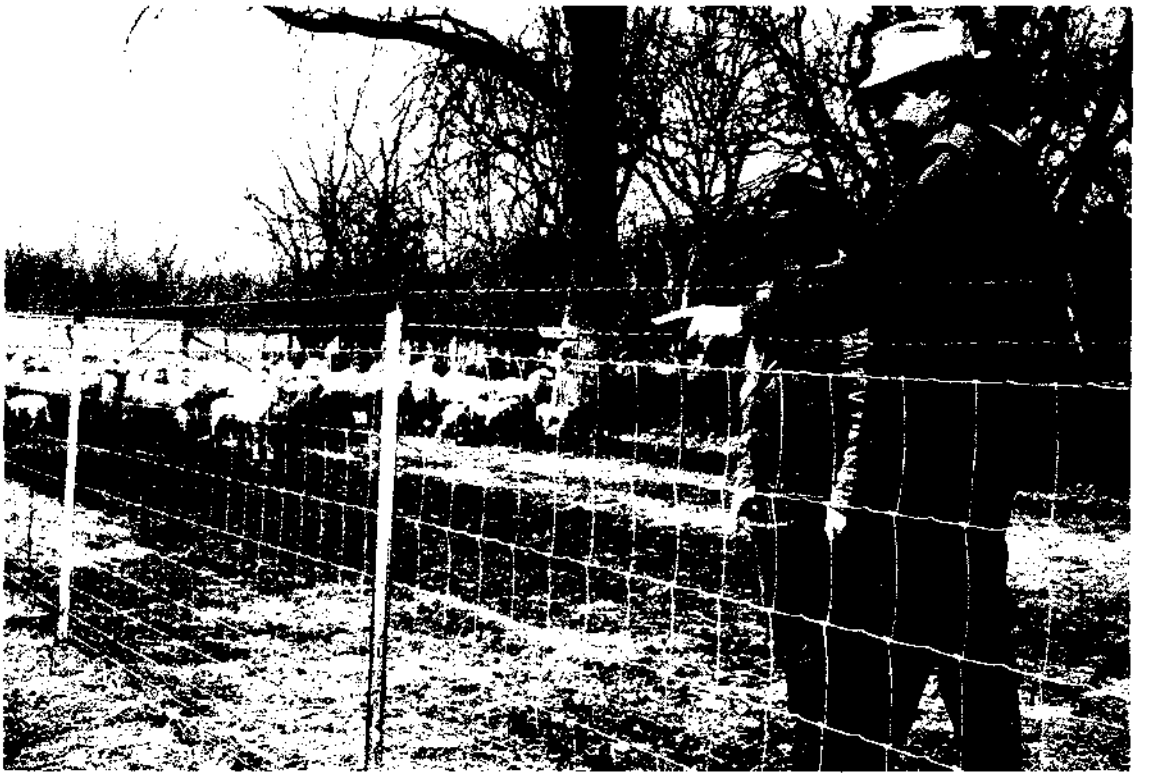
The main point brought out by research to date is that the predator damage control problem is much more difficult and complex than anyone ever realized. Clearly, it has shown that the coyote is a highly adaptable and versatile predator which is holding its own and even appears to be expanding its range. Past experience has shown that eradication or population reduction attempts are tremendously expensive, must be carried out continuously over vast areas, and have dubious effectiveness in reducing coyote populations or problems. Aside from that, continuous control efforts tend to "educate" the remaining coyotes and make "control" an increasingly difficult job. Although man has learned much about the life histories and effects of animals living together in a given area, far more remains unknown to him. Perhaps man has learned enough to realize that he will be better off to work with nature rather than to force his will upon her.

Livestock Losses

Livestock losses to predators represent a serious problem to many livestock producers in the United States. The sheep industry is hit hardest by predation, but there are also losses in calves, small pigs, goats and poultry. The single most important predator on livestock is the coyote. In some areas of the country, domestic dogs, mountain lions, bobcats, bears, foxes and eagles cause some livestock losses. After the coyote the next most important predators in Kansas are domestic dogs, while bobcats, foxes and eagles may cause occasional losses.

Accurate estimates of livestock losses to predators are difficult to obtain, largely due to the difficulties in examining a significant fraction of the losses in time to determine cause of death. In Kansas, we have basically five sources of estimated predator losses for various years. These are: 1) a 1949 survey reported by Gier (1968); 2) Annual Reports, Rodent and Predator Control Project, Kansas State Extension Service, 1954-1960; 3) Kansas Crop and Livestock Reporting Service (1968); 4) USDA Economic Research Service (1974); 5) Meduna study (1977) Division of Biology, Kansas State University. Loses of stock sheep and lambs to coyotes and dogs averaged less than one percent during 1975-76 in Kansas. (Rebel et al. 1981).

Each method of determining livestock loss to predators has advantages and disadvantages. Mail surveys, questionnaires and personal interviews are relatively low in cost, but are hampered by the fact that it is impossible to confirm losses. Biological studies, in which an attempt is made to necropsy all dead animals, avoid the problem of loss confirmation, but are time-consuming and expensive. Also, it is difficult to find and examine all dead animals in time to determine specific cause of death. Because of the large amount of time required for this type of study, it is difficult to sample many producers.



In Kansas, the coyote is not as much of a serious threat to the sheep industry as he is farther west. in order to understand why this is true a review of the sheep industry-coyote problem is in order to aid in understanding the problems.

Kansas is located in the Plains-Wheat-Corn-Sheep-Producing area of the Western United States. Most of the sheep are raised in farm-flock management schemes rather than range sheep flocks where greater problems occur between coyotes and sheep.

According to a USDA study, loss rates of lambs and sheep to coyotes were highest in States with public range grazing and mountainous terrains. Comparatively few deaths due to coyotes occur in the Plains States of Kansas, Nebraska, and North and South Dakota.

Part of this difference in proportions was likely due to location and part to type of management. The larger herds are more often pastured on open ranges where exposure to coyotes is greater. In comparison, smaller herds are usually located in more intensive farming areas and/or are kept more confined.

Certain management practices do contribute to coyote predation of lambs. The proportion of sheep which are pasture or range-lambed has probably increased over the past 20 years along with the proportion of total sheep on large-scale operations. Although this change in the management system reduces labor costs, it increases the exposure of young lambs to predators as well as to death by natural causes such as weather.

Some interesting differences existed between a comparison of ranchers with high and low predation losses. High-loss producers had a much lower average docking rate, 90 lambs per 100 ewes compared with 113 for the low-loss producers. Range lambing appeared to be a contributing factor in this mortality difference. Proportionately more of the high-loss producers range-lambed—65 percent, compared with 41 percent of the low-loss producers.

How Should We Spend Our Tax Dollars?

There are five basic programs tax payers may employ to deal with predator damage control problems.

1. The first of these five basic program appreaches is simply to do nothing. Although this has never really been tried, at least officially, it may have some merit. It may be that a state government doing nothing to help in predatory animal damage control would thereby encourage the people themselves to adjust management practices so as to protect their livestock from whatever conflicts they might have with wild animals.

2. A second approach would be to have private pest control operators entirely responsible for handling animal damage control problems when and where they occur at the

choice of the owner on whose property these problems are occurring. The pest control operator would be paid by the customer for his services. No government or tax payer money would be needed in such an arrangement. Again, this is not a common practice in any area as large as a state; however, private pest control operators are becoming more involved in vertebrate animal damage control than they have been in the past. If there is indeed a serious problem in this area, it would seem logical that private industry could provide a solution to these problems.

This leaves us with three additional alternatives. These next two are the most commom ones employed in predator damage control programs which are financed by tax payers of a given area. We are going to use for comparison the programs in Nebraska and Kansas in the year 1976. In addition to predator damage control, the Nebraska and Kansas programs also offer educational assistance in controlling

EDUCATIONAL AIDS TO KANSAS WILDLIFE DAMAGE CONTROL PROGRAM

RODENT DAMAGE CONTROL

Publication:

Controlling Rats—AF-43
Controlling House Mice—AF-42
Controlling Pocket Gophers—L-346
Black-tailed Prairie Dogs—AF-12
Use of Smoke Cartridges—AF-32
Use of Zinc Phosphide in Prairie Dog Control—AF-29
Kangaroo Rat—AF-30

BIRD DAMAGE CONTROL

Publications:

Walk in Type Pigeon Trap—AF-11
Pest Bird Management—C-585
Starling Control in Feedlots (new)–AF-7-80.

U.S. Fish and Wildlife Service Publications:
Controlling Crop Depredations of Blackbirds/Starlings—ADC 105
Controlling Bird Damage, A List of Sources of Supply—ADC 104
Controlling Blackbird/Starling Roosts by Dispersal—ADC 103

PREDATOR DAMAGE CONTROL

Publications

Managing Predator Problems—C-620
How to Call Coyotes—C-400
How to Trap Coyotes—C-522
How to Skin Coyotes—C-467

Slide Sets:

How to Trap a Coyote—The slide set consists of 125 slides which cover how to trap a coyote, how to trap a bobcat and how to skin a coyote and prepare the pelt for sale. Cassette narrated with printed script.

How to Call A Coyote-This slide set consists of 52 slides intended to provide knowledge as to the step-by-step learning process of attracting coyotes by artificial calls.

Opportunists of the Prairie—This slide set contains 80 slides which attempt to tell the story of the coyote in Kansas. It covers the biology of the coyote and the situation pertaining to livestock losses due to coyote predation.

Physical Evidence of Carnivore Depredation—This 223-slide set prepared and narrated by Texas A&M Extension Service. Very good. Should be viewed by all county agricultural agents. Available from State Extension Wildlife office only.

OTHER WILDLIFE DAMAGE CONTROL

Publications:

Bats and Bat Management—AF-48
Controlling Moles—L-343
Proceedings of the Fourth Great Plains Wildlife Damage Control Workshop, Manhattan*

*All Proceedings sold for $4
Great Plains Handbook on Prevention and Control of Wildlife Damage–Price $15

damage from field rodents, commensal rodents and birds when requested. The recommendations for controlling damage from all species follow sound, biological principles and are in accordance with federal and state laws.

3. The Nebraska program is termed a "service program."

Basically, a service type program is one in which persons are hired (usually by the state or federal government) to respond to requests for help with damage due to depredations by wild animals.

Nebraska's animal damage control program is a cooperative one between the State of Nebraska and the U.S. Fish and Wildlife Service. A Memorandum of Understanding is in effect between the Service and Nebraska's Departments of Agriculture, Public Health, and the Cooperative Extension Service. A supplemental agreement with the State Department of Agriculture provides cooperative funding for field operations.

The program is administered by the U.S. Fish and Wildlife Service and is under the direction of the State Supervisor, Division of Animal Damage Control in Lincoln. An Assistant State Supervisor is also stationed in the Lincoln office and a Pilot is stationed at North Platte. District Field Assistants are located strategically over the state with one serving as aerial gunner.

Services are provided with the objective of controlling damage to agriculture and protecting public health from damage by non-game mammals and birds and rodents.

The program provides operational (doing) assistance on a request basis for the control of damage caused by predatory mammals. Chief among these is damage caused to Nebraska's livestock and poultry industries by coyotes. Traps, snares, M-44's, ground and aerial shooting are the tools used in operational activities.

The program also provides extension type assistance on predator damage control and other wildlife damage problems as applicable. The goal is to resolve these damage problems in the most effective, selective, and efficient manner possible.

When a Service program is first implemented, requests for assistance and reported losses are typically high. After the program is established, requests for assistance and reported losses are reduced as problems are resolved. Wildlife damage is a dynamic function so losses and problems never completely stabilize.

A long time ago some trappers working in a service-type program realized they could not respond to all the calls for service they received and added a new touch; they taught the producer himself how to locate good trapping sites and make sets. This has worked out especially well in some states; not only does it take care of that producer's immediate predator problem, but it enables him to take care of future depredations, all by himself. He doesn't have to wait for a trapper.

These experiences have shown that some producers who are really concerned about predator damage are also interested in learning how to trap. Moreover, they learn very quickly. Thus came the old idea of Extension education—that of helping people to help themselves. It has grown into what is now known as the Extension Predator Damage Control Program, the fourth of our alternative approaches to helping solve conflicts between man and wildlife.

4. The system now used in Kansas is a good example of an Extension Predator Damage Control Program. A questionnaire survey of producers who received training from Kansas animal damage control specialists during the period July 1, 1975 through June 30, 1976 evaluated the effectiveness of training in reducing predator losses. Nonrespondents were contacted by telephone whenever possible. Useable responses were obtained from 63 of 77 (82 percent) producers receiving training.

A total of 52 percent of those receiving training were able to stop their losses completely. Reported predation losses after training were substantially lower than those reported prior to training. Sheep producers reported an overall 79 percent decrease in their sheep losses to predators following training (with the exception of two producers who actually reported a combined **increase** of two percent in their predator losses, despite the removal of 79 coyotes). Producers also reported decreases of 76 percent in calf losses, 89 percent in swine losses, and 53 percent in poultry losses. These exact figures may not be too meaningful because of the different lengths of time involved in reporting losses before and after training. However, the results suggest overall loss reductions in the neighborhood of 75 percent.

Of those receiving training, 42 percent in turn showed someone else how to stop damage, multiplying the effects of the program. The number of requests for assistance in predator damage control has declined steadily since 1970. A total of 92 percent of those responding approved of the educational program as conducted.

A total of 61 percent of the producers reported using more than one method in their attempts to reduce losses. Methods employed were: steel traps (92 percent), firearms (35 percent), livestock management (30 percent),

snares (27 percent), predator calls (24 percent), and dogs (8 percent). Nine producers (15 percent) indicated that they would like to be able to use poisons in predator damage control, particularly sodium cyanide in the M-44 device. (Use of poisons, aircraft and bounties in predator damage control are outlawed in Kansas.)

Producers receiving training captured a mean of 6.2 coyotes. This figure is probably inflated somewhat by the fact that some producers trapped coyotes for fur in addition to controlling damage. Producers reported capturing 6.7 percent nontarget species.

The Kansas program is low in cost. Compared to conservatively estimated budgets of 16 other Great Plains and Western states, Kansas taxpayers pay six times less than the next lowest budget and have fewer recorded or reported losses, have less controversy and have a program that is effective and efficient.

The program is conducted through the Cooperative Extension Service at Kansas State University in Manhattan. Three people are employed in the Kansas program, two specialists and one secretary. County Extension agricultural agents are the front-line force in directing and motivating the field program. They direct the deployment of specialists to provide assistance and consultation to individuals experiencing livestock losses. A Memorandum of Understanding between Kansas State University Cooperative Extension Service, Kansas Fish and Game Commission, Kansas Department of Health and Environment and U.S. Fish and Wildlife Service is reviewed once a year.

This memorandum assures that the Kansas program employs the use of selective

methods of predator removal and stresses the development of effective management of domestic livestock. This approach encourages the maintenance of maximum livestock quality and production and contributes to the conservation of the state's resources.

County Agricultural Agents organize requests for training service. Farmers having damage go to the agents just as they do for help with other farm problems. The agents arrange for local training, set dates, announce meetings and demonstrations. Sometimes they tie training in predator trapping with other kinds of farm demonstrations.

When a date has been scheduled, an Extension trapper meets with the producer group. On the first day's meeting, the trapper usually explains the program. He often shows movies of trapping, hands out informative bulletins, and answers questions. Then he goes through the trapping process step by step. He shows where to look for predator signs and where and how to make a good set. Then he has the interested producers do it themselves. All demonstrations are made right on the areas where damage is occurring; the final set is meant to catch the predator doing the damage. If any producer wants more training later, he gets it on follow-up calls.

Objectives of the Kansas Program

The primary objectives of the coyote damage control effort in Kansas are: 1) to provide relief from predation on livestock by coyotes; 2) to develop educational materials for youth and adults to enable them to understand problems and how to solve them; 3) to maintain liaison and an effective working relationship with stockmen, agencies, and organizations; 4) to develop additional ways to prevent losses and 5) to encourage livestock husbandry methods that tend to prevent livestock losses due to predation.

A disadvantage of the Extension System is the need in a few cases, for assistance beyond that of an educational nature. Some problems could be solved faster by professional involvement.

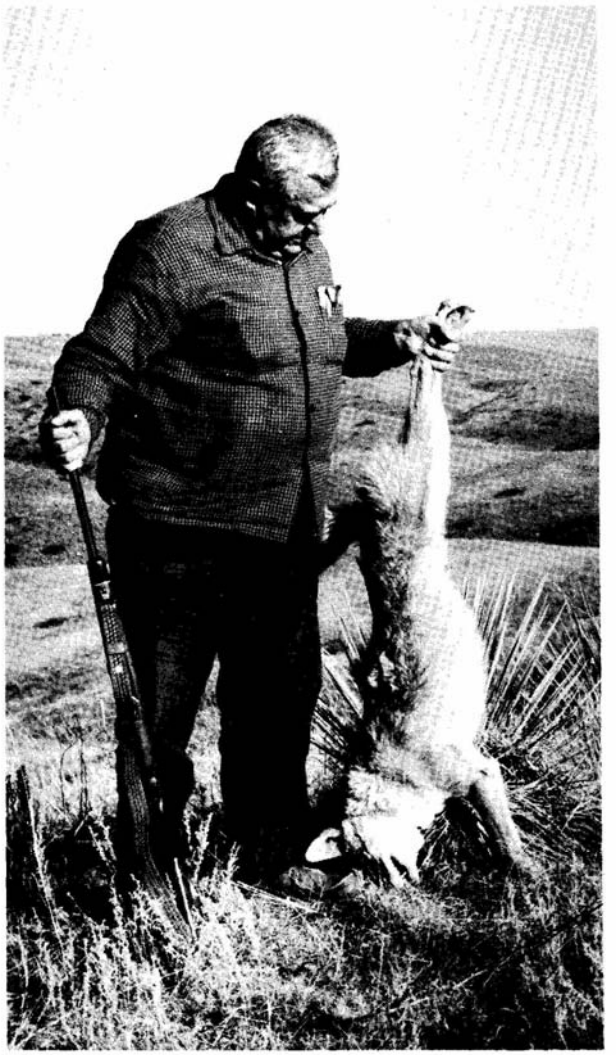
5. The fifth approach that could be used to solve wildlife damage control problems is to combine the service-type and Extension type approach. This idea is relatively new and has not been employed in the United States.

The need for reasonable environmental protection in the United States is increasing day by day, resulting in restrictions on many of the tools available for solving animal damage problems.

At the same time, the educational approach to solving problems has a great deal of merit in most cases. But in those few instances in which the individual who has received educational assistance is unable to solve his problem it seems appropriate that additional assistance should be available.

To avoid requests for such help in cases where it is not really needed, it is essential that this additional assistance be provided at a nominal fee to be paid by the person experiencing the animal damage problem. Such a fee would cover technical services for the period of time needed to solve the problem.

Such a program would cost more money than the Extension approach but it would provide the means for solving serious problems, and would allow the use of highly technical and specialized tools by professionally trained persons. For those who don't need such help, it would provide for the dissemination of information so that people can help themselves.



Conclusion

Regardless of which means people choose to correct or prevent the conflicts between predators and livestock, man's responsibility will always remain a key factor. Sheep have not changed in the last 2,000 years, neither has the coyote. The only thing that has changed is peoples' way of thinking regarding sheep and coyotes.

In thinking about livestock, predator problems we might do well to heed the Bibical admonition, "The good shepherd giveth his life for the sheep, but he that . . . seeth the wolf coming and leaveth the sheep, and fleeth, and the wolf catcheth them and scattereth the sheep . . . ." (St. John's XII.)

We believe that it is possible to employ preventive measures to successfully protect livestock from predation. Producers should be willing to closely examine their livestock husbandry methods as they relate to predator losses. It is unlikely that real progress can be made until such management considerations are evaluated. However, there is another aspect of the problem which must be addressed, as well. There is an increasing trend toward overreaction to necessary control measures and demands for undue protection for coyote populations. It is important to emphasize that some coyotes do kill livestock under the very best management procedures. At times, coyotes do become overabundant in areas and create nuisance, depredation and public health problems.

We hope that this booklet provides you with the knowledge you seek and need to make decisions for now and in the future. We have tried to assemble here the current knowledge concerning predation involving particularly the coyote.

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