THE CHARACTER AND DIMENSIONS OF SHEEP DEPREDATION IN BENTON COUNTY, OREGON

by

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ABSTRACT. Despite a relative decline in the size of Oregon's sheep industry, the problem of sheep depredation remains a serious economic and environmental dilemma in need of objective examination and innovative solutions. An investigative report on the problem as it occurs in Benton County can contribute to the information required to realize this end. Domestic dogs and coyotes are the county's principal sheep predators, with foxes, bears, bobcats, and large birds being responsible for a relatively insignificant loss. Two organizations share the predominant responsibility for reducing stock loss due to predation in Benton County: the Benton County Dog Control Board, and the Oregon Interagency Predator and Rodent Control Committee, through which the division of Wildlife Services assists Oregon residents. KEY WORDS: Patterns of predation, Magnitude of loss, Ineffectual information, Perception, Federal restrictions on control, M-44s, Trapping, Land use.

INTRODUCTION

Predation has long been a significant source of vexation to American sheep growers. The problem persists despite an impressive history of effort directed toward controlling or reducing predator populations. The recent growth of an environmental consciousness has brought the instituted control measures into the arena of public criticism, resulting in the evolution of a politically sensitive and controversial issue. The emotional energy generated by opposition between indurate factions of the environmentalists and the sheep growers has tended to obscure and disproportion the realistic nature of this problem. Much of the subsequent action and legislation has been based largely on constituent pressure, guarded self interests, biased reporting, and a general paucity of reliable and effectual data.

A NEED AND OBJECTIVE

A need for further investigation of the livestock depredation problem was evidenced by a recent study submitted to the Environmental Protection Agency (EPA) by the Oregon State Department of Agriculture.[1] The intent of the study was to gain EPA registration of sodium cyanide for restricted predator control use within the state. In spite of the fact that the effort apparently represents a fairly exhaustive collection of the best existing information relevant to the support of the report's objective, the completed product presented very

little effective data or research specific to the state of Oregon.

Stimulated by this recognition, this research presentation has as the objective the provision of a limited contribution toward apprehending the true character and dimensions of sheep depredation in Oregon. The approach is in the form of a case study report in which the problem of sheep depredation, as it occurs within the selected study area of Benton County, is examined.

METHOD OF INVESTIGATION

A survey of existing published material related to the research problem was made to construct an information base upon which guidelines for directing interviews and their subsequent evaluation could be developed. A series of interviews was then conducted with a deliberate effort at obtaining contributions from individuals representing each interest of this many-faceted issue. Field observations in the form of examining various local sheep operations, witnessing firsthand the application of predator control measures, and inspecting the resulting damage of predator activity were used to assist in judging the validity of information gained in the course of this research.

THE PHYSICAL SETTING

Benton County is located on the western periphery of the mid-Willamette Valley. Its 427,520 acres (173,000 ha.)

ranks thirty-third in land area among the thirty-six counties in the state. The Willamette River forms the eastern boundary from which flat valley bottom land extends westward, rising onto successively older river terraces, for approximately a third of the county's breadth until gradually merging with the Coastal Range. The western two-thirds of the county is predominately a wooded and hilly terrain interspersed with small tributary river valleys, most of which drain into the Willamette River. These small valleys account for many isolated pastures dotted throughout this portion of the county. Cleared hill slopes also provide grazing land in this area (Plate 1).

THE SHEEP INDUSTRY

In January 1971, Benton County ranked fourteenth in the state with approximately 12,000 head of sheep.[2] Over the past several decades the county's sheep inventory has shown a general decline with a similar pattern occurring for the state (Table 1).

TABLE 1.--SHEEP INVENTORY FOR THE STATE OF OREGON AND BENTON COUNTY RESPECTIVELY (thousands of head)

	1940	1950	1960	1969	1970	1971
Oregon	1,675	689	916	569	530	484
Benton County	29	18	31	22	16	12

Source: Department of Agricultural Economics, Extension Service, Oregon State University, Oregon Commodity Data Sheet, Corvallis, Oregon, October 31, 1972.

PLATE 1.--Grazing on Cleared Hill Slope

PLATE 2.--Feeder Lamb Operation on Valley Floor

Presently (January 1974) there are approximately 8,800 head in Benton County.[3] These animals are distributed among an estimated 140 growers, but a majority of the sheep are owned by eight large-scale operators.[4] The remaining animals are divided into many smaller flock ownerships ranging from several hundred head to as few as five to ten sheep.

A rough pattern of sheep distribution within Benton County was contrived by first determining the number of animals reported for each assessment rate district, then plotting these values on the county tax assessor's code map (Fig. 1). As can be noted, the principle concentrations are located in the southeast quarter of the county. These high numbers represent the larger feeder lamb operations that utilize the grass seed fields located in this area for winter grazing (Plate 2).

There are two main segments comprising the sheep industry of Benton County--spring lamb production and feeder lamb production. The spring, fat, or milk lambs are sold directly off the county's breeding ewes. These lambs are born in late December to early February, then marketed that spring. The majority of feeder lambs, however, are brought in from other areas such as eastern Oregon, Idaho, Wyoming, or Montana. They are fattened over the winter, mainly through grazing on grass seed fields, then sold the following spring.

The breeds represented within the county include Hampshire, Romney, Suffolk, Columbia, and the more exotic varieties including Lincoln, Southdown, Finn, and North Country Cheviot.

THE PREDATORS RESPONSIBLE

Sheep are characterized as being notoriously helpless animals in the face of predator attack. A long history of constant breeding in favor of enhanced wool and meat production has virtually eliminated the natural defenses that aided the survivability of a distant wild ancestor. Based on the experience of growers in Benton County, there does not seem to be any difference in the relative susceptability to predation of one breed as compared to another. All are apparently equally subjected to predacious injury and fatality.

Within the confines of Benton County, sheep are exposed to variable depredation by domestic dogs, coyotes, bears, bobcats, and newborn lambs are further subject to foxes and large birds of prey. Dogs and coyotes are by far the largest sources of sheep loss through predation with only spotty, and for the most part, insignificant losses attributed to other animals. Only one bear kill was noted during the interviews with local sheep growers. Bobcat kills have also been infrequent despite the fact that numerous predation incidents ascribed to the bobcat have been verified in the marginal hill region directly across the valley in Linn County.[5] The Division of Wildlife Services trapper for Benton County reports a scarce bobcat population for the area and only a few taken in his traps.

Fox and large birds are only a threat during lambing time when the newborn lambs are unresisting prey, and of a

size that these smaller predators can handle. The problem from fox, primarily the red fox (Vulpes fulva), has recently been very slight as far as sheep are concerned. The trapper was aware of only two fox incidents concerning sheep in the past year. However, the number of sightings and the frequency of fox predation on chickens, ducks, and other domestic fowl, indicates a substantial fox population in the county. Although it is not known to what extent large birds factor in lamb losses, it is apparently minimal. Only one case where the actual kill was witnessed by the farmer was noted during this investigation. The bird was described as "an eagle."

The Coyote

Indigenous to the state, the coyote (Canis latrans) has gained a substantial reputation for being an extremely adaptable animal in the wake of human intervention into his domain.. He has survived extensive campaigns to reduce or eliminate his numbers, and evidence seems to indicate that the increased food supply brought about through the introduction of livestock into the Willamette Basin and the resulting changes in vegetational succession has permitted a pronounced increase in the coyote population during the last twenty years.[6] Moreover, the control efforts waged against the coyote have tended to selectively weed out the less adaptable and dumb individuals, gradually creating a superior breed.

Prior to 1920, coyotes were unknown on the valley floor west of the Willamette River. Now they range throughout the entire Willamette Basin excepting the dense urban areas and the extensive stands of mature coniferous forest.[7] This pattern of intrusion is substantiated by sheepmen utilizing the bottom land adjacent to the Willamette River in Benton County. Until ten to fifteen years ago, coyotes were not seen or heard by these farmers. Coyote predation was only a problem for those farms along the valley margin and in the hills. Now coyotes are relatively common in the bottom lands and have become a significant threat to grazing sheep.

In the fifties and sixties, the coyote population in the Willamette Basin was thought to have stabilized at a conjectural level of approximately 5,000 animals, held in check by food availability and predator control measures.[8] No adequate population estimates for Benton County were located; however, the range of the coyote now includes essentially all rural land in the county.

The coyote is primarily an opportunist, taking food that is most readily available and easiest to kill. Untended flocks of sheep easily fit into this category of prey. The opportunist character is further revealed by the fact that, even though he is killing for food, it is not uncommon for the coyote to take more than one sheep and devour only the choice portions from each animal, leaving the rest.

The Domestic Dog

Predatory damage by dogs in Benton County is due almost entirely to domestic canines and not feral packs or individuals. Although the larger dogs are likely to do more damage, the smaller animals have the capability of doing considerable harm to sheep. Unlike the wild predators, dogs are prone to kill sheep only for the instinctive excitement of the chase rather than for reasons of hunger. Incidents of ten or more sheep having been killed or maimed by one or several dogs, without any portion of the carcasses being taken for food, are not uncommon in the county.

The approximate magnitude of Benton County's stray dog problem is indicated by the number of animals apprehended through the dog control program (Table 2). These annual totals represent only those dogs that were picked up by the dog control officer and do not show animals that were killed by a farmer protecting his stock or those that died from other causes. Existing data for the period 1971 through 1973 is incomplete due to organizational changeovers within the county's dog control program. From February 1974 to October 1974, 2,300 dogs were picked up with 870 returned to their owners or sold and 1,430 destroyed.[9] These totals are substantially larger than the trend in Table 2 would seem to indicate due in part to increased operational efficiency in county dog control efforts, added manpower, and separation of city (Corvallis) and county jurisdiction in dog apprehension responsibility.

TABLE 2.--ANNUAL BENTON COUNTY DOG APPREHENSION AND DISPOSITION RECORDS FOR THE YEARS 1963 - 1970

Year	No. of dogs apprehended	No. of dogs claimed or sold	No. of dogs destroyed
1963	429	58	371
1964	626	128	498
1965	616	115	501
1966	768	338	430
1967	920	365	555
1968	806	335	471
1969	761	357	404
1970	810	419	391

Source: Compiled from records of the Benton County Dog Control Board (formed in 1961).

A stray dog is one that either is temporarily not under the direct control of its owner or an animal that has been deliberately abandoned. Frequently dogs are allowed to roam at will due to owner negligence or because many rural residents feel that "in the country it is alright," and are apparently ignorant of the harmful potential of this attitude. Owners who become disenchanted with a pet; who are moving away; or who are forced, for a variety of reasons, to give up a dog, sometimes take the animal into the country and abandon it rather than delivering it to the pound.

The Benton County Dog Control Board reports that the greatest number of stray dog pick-ups occur in the months of December and June. This has been attributed to the students at Oregon State University who are moving away and choose to leave their pets behind. The manager of the Finley National Wildlife Refuge, in southern Benton County, confirms this phenomena as some of the animals are deposited on refuge land.

In that there does not seem to be a significant feral dog population in Benton County, it can be assumed that most of the abandoned animals are picked up by the dog control officer or killed by livestock owners within a relatively short period of time.

Identification of the Responsible Predator

It is usually not difficult for an experienced individual to identify the guilty predator by the condition of the sheep carcass, provided the kill is located before scavengers destroy the evidence. Coyotes operate with surgical deftness, bringing the prey down with a single bite in the neck, crushing the trachea and larynx. Usually only the choice organic portions of the kill, such as the heart or liver, are preferred and often the muscle is left untouched. In some instances, only the blood will be taken. A bear tends to kill a sheep by breaking its neck with a paw or biting the spinal area. At times he will eventually eat the whole animal if not interfered

with, and may characteristically drag the carcass off to another location away from the kill site. The dog, by contrast, is an extremely sloppy, inexperienced and consequently inefficient killer, frequently succeeding in only maiming the victim. The kill is made by continuous haphazard biting and tearing at the sheep with a resultant torn and ragged carcass left as a signature for identification. The finding of wool strewn over the area is a common characteristic of the predation site when dogs are responsible.

A problem in recognition may arise when a dog gains enough killing experience that it becomes difficult to distinguish his kill from a coyote's. Correspondingly, a young coyote pup who has just begun hunting on his own may have a sloppy dog-like technique until sufficient killing experience is gained.

On occasions, wild predators are unjustly blamed for a kill when they scavenge a sheep that has already succumbed to other causes. Generally, a sheep that died from wounds inflicted will show signs of bleeding, whereas a sheep that died of other causes and was then fed upon, will not show signs of having bled at the wound.[10]

SPATIAL AND SEASONAL PATTERNS OF PREDATION

Although sheep depredation by coyote is possible almost anywhere in the rural areas of Benton County, the probability is increased considerably when wood or brushlands approximate

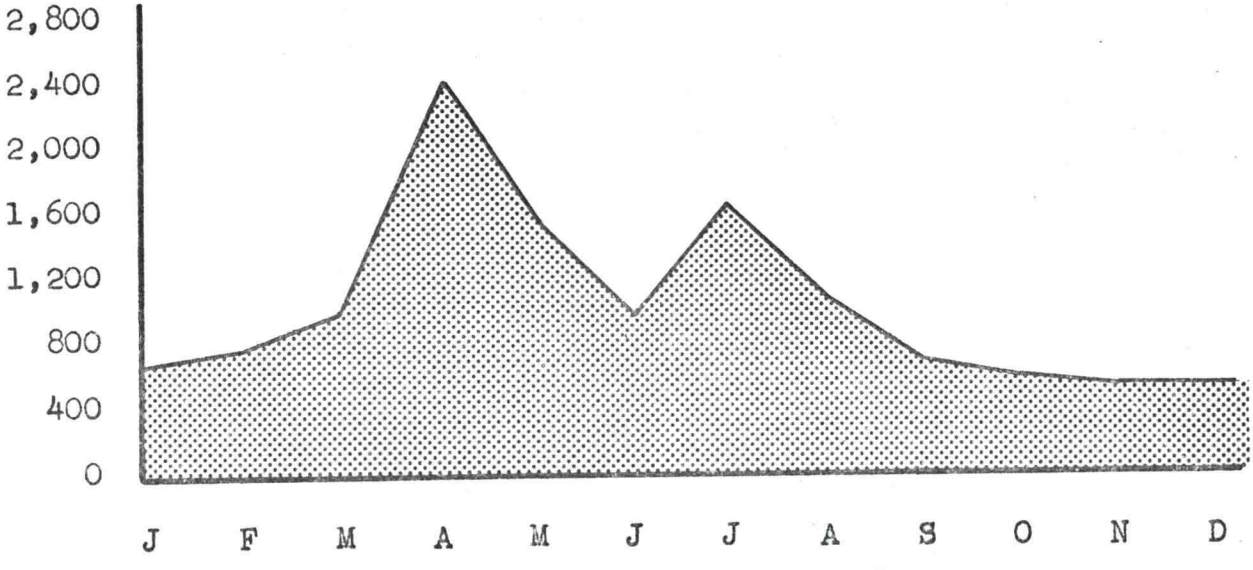
the pasture. Reported losses indicate that a greater percentage of coyote problems occur along the valley margin and westward, where a wooded and hilly terrain predominates. An obvious factor in the coyote's adaptive survival in a man-modified environment is his ability to remain unseen; thus, a marauding coyote, whose activity is chiefly nocturnal, will have a tendency to hunt those areas that are close to a wooded retreat where it can seek refuge during the day or when alarmed. The scrub woodland along the Willamette River has apparently also become a sanctuary for the coyote, with a resulting increase in the number of related losses for the adjacent pasture areas. Kiger Island seems to be the one exception in that no sheep losses due to coyote were reported.[11]

Another factor which may direct the spatiality of predation is the practice by some growers of not retrieving or burying the carcasses of sheep that die from various causes. The carrion may serve as an attractant to predators, increasing the risk for a grazing flock in the immediate area. This form of negligence was frequently observed during the field research portion of this investigation (Plate 3), although it was also noted that several farmers interviewed are cognizant of the possible consequences and promptly dispose of their dead stock.

In spite of the difficulty in ascertaining the existence of seasonal patterns of coyote predation on the basis of

PLATE 3.--Sheep Carcass Left to Decompose in Pasture

FIGURE 2.--MONTHLY TOTAL OF SHEEP LOSSES DUE TO COYOTE IN OREGON FOR YEARS 1970 - 1973



Source: Division of Wildlife Services - Oregon.

the small amount of available data applicable to Benton County, a basic understanding of the coyote's natural history and a reliance upon the perception of the local sheep growers reveals that a pattern does exist. A pronounced increase in sheep losses due to coyote occurs during the months of April and May, with a sustained but slightly declining high continuing until late July or early August, after which a rapid tapering to a more or less steady level of activity for the remainder of the year is evident. This pattern may be substantiated by graphing the monthly predator loss totals compiled for the state by the Division of Wildlife Services (Fig. 2). The indicated seasonal fluctuation of activity is attributed to the denning period when the additional food requirements imposed by the coyote's young must be met, and to a lesser extent, the subsequent training of the pups in predator skills by the parent.

A predictable spatial pattern of predation due to dogs was not discovered in the course of this study. Although it was found that the neighbor's dogs were frequently responsible for a farmer's sheep loss, reportedly it is not uncommon for dogs to roam five to ten miles away from home in a night, often while pursuing deer during the cooler months. Hence, a sheep producer whose neighbors maintain proper control over their pets is by no means immune from depredation by dogs.

A seasonal pattern was apparent. Dogs are noticeably less active during the hot, dry months of summer. Records of monthly sheep loss claims handled by the Benton County Dog Control Board (see page 33 for an explanation of the county reimbursement program) indicate a slack period beginning in June and lasting through September (Table 3).

TABLE 3.--MONTHLY TOTAL OF SHEEP LOSS CLAIMS SUBMITTED TO THE BENTON COUNTY DOG CONTROL BOARD FOR YEARS 1964 - 1973

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1964	2	1	-	-	4	-	-	-	-	2	1	-
1965	1	1	-	-	3	-	-	-	-	-	-	-
1966	-	-	1	2	2	-	-	-	-	-	1	1
1967	2	-	1	1	2	-	-	1	-	2	1	1
1968	-	1	2	4	2	1	-	-	-	-	1	-
1969	1	-	1	1	-	-	-	-	-	1	1	-
1970	1	2	1	1	3	2	-	-	2	1	2	2
1971	1	4	3	-	5	1	1	-	1	3	6	4
1972	1	1	2	2	3	1	-	2	-	3	3	-
1973	1	-	1	5	1	2	-	1	1	2	-	1
Total	10	10	12	16	25	7	1	4	4	14	16	9

Source: Unpublished records obtained from the Benton County Dog Control Board

Further examination of Table 3 also reveals a slightly lesser decline in activity during the months of December, January,

and February. These seasonal variations in activity were confirmed by dog control officers in both Benton and Linn County.

It should be noted that claims were shown in Table 3 rather than the number of corresponding kills because of the extreme variability in the number of sheep affected during each claimed incident. For example, Dog Control Board records show that during the month of August 1966, three sheep were killed in Benton County in two separately claimed incidents, while in August 1973, fifty-one animals were killed in the course of five claims. There clearly does not seem to be any significant correlation between the number of distinct incidents and the number of livestock destroyed by dogs.

THE MAGNITUDE OF LOSS INCURRED

Due to the coyote's efficiency as a predator, the extent of livestock damage is usually limited only to the animals that were singled out and killed with a minimal traumatic effect on the rest of the flock. By contrast, dogs may cause considerable damage in excess of those animals that were actually killed during the incident. A recent episode, in which the immediate aftermath was witnessed firsthand during this investigation, resulted in four sheep being killed with seven others sustaining critical injuries (Plates 4 and 5). Four of the seven

PLATE 4.--Sheep Kill by a Domestic Dog

PLATE 5.--Severe Injuries Caused by a Domestic Dog

had to ultimately be shot as the inflicted wounds were too severe for eventual recovery (Plate 6). The other three were given a fair chance for survival provided that massive antibiotic therapy and attentive care was administered. Two dogs were deemed responsible and, from observable evidence at the kill site, the pattern of events was typical for a dog incident of this nature. The flock had been subjected to extensive chasing with the dogs haphazardly biting at the victims. No portions of any of the carcasses were taken for food by the dogs.

The tallying of fatally or critically injured animals in the aftermath of such an episode may provide only an ostensible indication of the actual magnitude of loss. In some cases, mortality does not occur until much later when the sheep succumbs to secondary infection. Even a small wound can easily become pathogenic in nature, particularly during the warmer months when screwworm infestations are likely.

An additional source of loss presents itself when dogs harrass breeding flocks during the gestation period. Even though the sheep may not be bitten, the stress of the chase and being run into fences and other obstacles, as frequently happens, is sufficient to induce abortions in a flock of pregnant ewes; thus, the size of the farmer's expected lamb crop is diminished.

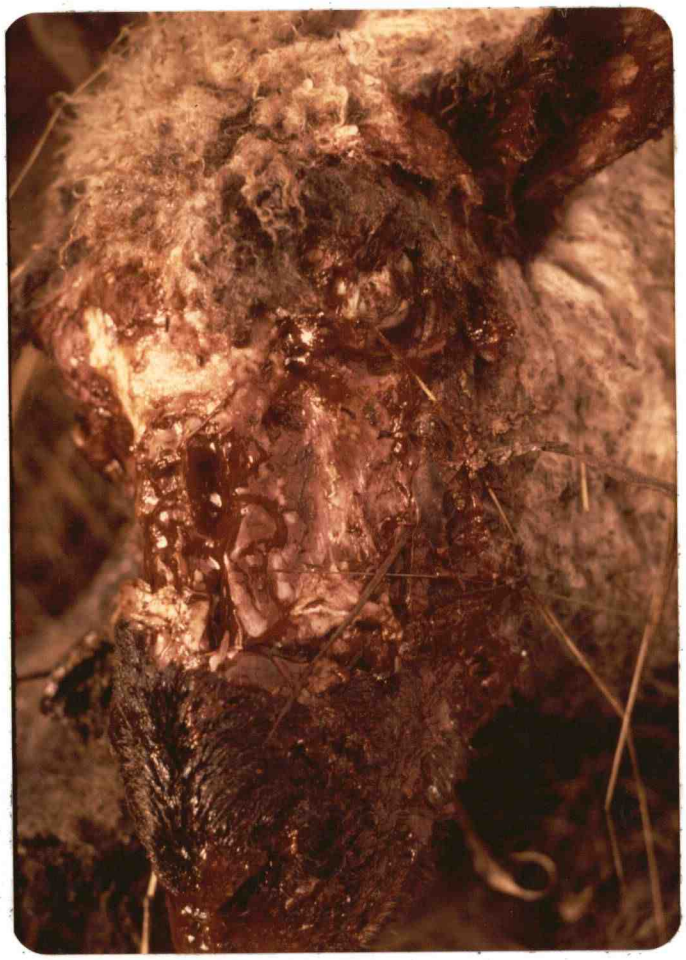


PLATE 6.--Critically Injured Animal

Data compiled by the Division of Wildlife Services give some indication as to the magnitude of the sheep loss due to coyote in Benton County (Table 4).

TABLE 4.--TOTAL ANNUAL SHEEP LOSS DUE TO COYOTE IN BENTON COUNTY FOR YEARS 1968 - 1971

	1968	1969	1970	1971
Sheep	14	21	26	22
Lambs	104	40	29	74
Total	118	61	55	96

Note: These totals actually represent activity by all wild predators; however, in Benton County the coyote is estimated as being responsible for more than ninety percent of the losses.

Source: Division of Wildlife Services - Oregon.

These data are based on the monthly reports submitted by the Division's District Field Assistant (trapper) who is assigned to the county through the cooperative predator control program for Oregon (see page 33 for a description of this program). Benton County did not participate in the program during fiscal year 1972 or 1973; hence, the data for this period was unavailable. The Division of Wildlife Services states that only about twenty-two percent of the actual livestock kills by wild predators are seen and reported by the trapper, which would imply that each total shown in Table 4 must be

multiplied by a factor of 4.5 to gain a more realistic approximation (the Division's estimate of twenty-two percent is an observation based on the total effectiveness of all federal trappers operating within the state). Intuitively, it is concluded that this percentage is too small regarding sheep kills in Benton County. The growers interviewed were deemed representative of the county and each was vigilant of losses in his flock. Moreover, good communication between the present trapper and the livestock owners was apparent. The values shown in Table 4 probably represent at least fifty percent of the actual losses sustained.

In July 1973, Benton County renewed its participation in the cooperative predator control program and Division of Wildlife Services records show that twenty-two sheep and 107 lambs were reported lost to coyote for the period from that date until June 1974.

The magnitude of sheep loss due to dogs in Benton County may be partially indicated by the number of sheep involved in justified claims submitted to the Benton County Dog Control Board (see page 33 for an explanation of the reimbursement program) (Table 5). Many dog kills do not qualify as a reimburseable claim and thus have not been recorded. Further, losses incurred by growers who do not participate in the program are also unrecorded. More complete data representing all dog induced losses could not be located nor was it possible to determine what percentage of the total kills that Table 5 represents on the basis of

the information gained within the limits of this investigation.

TABLE 5.--TOTAL ANNUAL SHEEP LOSSES INVOLVED IN VALID CLAIMS SUBMITTED TO THE BENTON COUNTY DOG CONTROL BOARD FOR THE YEARS 1963 - 1973

Year	No. of Claims	No. of Head Lost
1963	21	57
1964	10	42
1965	5	19
1966	7	11
1967	11	34
1968	11	36
1969	5	20
1970	17	56
1971	29	88
1972	18	66
1973	15	81

Source: Unpublished records obtained from the Benton County Dog Control Board

THE DILEMMA OF INEFFECTUAL INFORMATION

There are currently only two sources of periodically collected data from which some indication of degree, seasonality, and other relevant patterns of predatory activity in Benton County may be derived. These sources, which were

previously referred to, are the monthly Depredation Report put out on an inhouse basis by the Division of Wildlife Services, and the unpublished monthly claims record informally kept by the Benton County Dog Control Board. Due to the circumstances under which each body of statistics is collected, particular care must be exercised to avoid reading more into the data than is actually present.

The Division of Wildlife Services statewide Depredation Report is broken down by counties participating in the cooperative predator control program for Oregon. The data specifically represent only those sheep kills that are verified by the District Field Assistant (trapper), and only those kills caused by a wild predator as domestic dogs do not come under Division of Wildlife Services jurisdiction.

In that the trapper operates on a request-for-service basis only, he is not free to monitor all livestock within the county for predation occurrences, nor would one man have the time were the freedom to exist. Generally, however, the situation in Benton County has been one of mutual cooperation. The dog control officers and the trapper inform each other of noted kills and assist each other in making predator identifications. According to the trapper, the sheepmen are also good about notifying him promptly when a kill is suspected to have been caused by a wild predator because it is in their own best interest to do so.

On occasions, a problem arises in locating the kill and determining the identity of the predator before scavengers have destroyed the characteristic evidence. Skunks, raccoons, oppossums, crows, and buzzards will commonly feed upon the carcass after the kill has been abandoned. As noted by the trapper, this is particularly a problem during the summer months when buzzards may completely pick over a kill within several hours.

The statistical information that may be obtained from Benton County Dog Control Board records is solely a derived by-product of an informal effort at bookkeeping. Compilation of data for the purpose of identifying patterns or trends is not the Board's objective in maintaining these limited records. Inadequate funding and a perceived lack of need by the county are apparently the reasons for the neglect in developing a more functional and complete system of record keeping. To present, only those sheep kills that are related to a reimbursed claim under the county reimbursement program are being recorded, with other dog induced losses going unnoted.

In April, 1973, the Benton County Agricultural Extension Service, in cooperation with the Benton County Livestock Association, developed a mail survey form entitled "Livestock and Poultry Predator Injury and Loss Report" (Appendix). This was distributed among the county's growers with the understanding that a copy of the report form would be

filled out and returned after each incident where a loss was incurred due to predatory activity. According to the county extension agent, the Livestock Association did not strongly support the effort and very poor cooperation from the farmers resulted in the project's general failure.

APPLIED PREDATION CONTROL MEASURES

Predation control measures that are being actively used in Benton County may be divided into three categories according to the source of the control:

1) Operator controls;
2) control services that are extended by the Benton County Dog Control Board;
3) control services available from the Division of Wildlife Services.

Operator Controls

Operator controls are those measures which are directly implemented by the farmer on his own land holdings. These may include on-site shooting of predators by farm personnel, fencing, shifting the flock away from trouble areas, and, in a few instances, trapping and poisoning.

Shooting is currently the most frequent method of control being used by the farmer. Coyotes are usually shot on sight. Fox may be left alone unless during lambing or if the farmer also has domestic fowl included among his live capital. Other wild carnivores capable of taking

sheep, such as the bear or bobcat, may or may not be shot depending on the individual farmer's perception of how much of a threat the animal imposes in a given situation. The opportunity for sighting any of the wild predators combined with the opportunity for being in a position to shoot the animal is a rarity, and sheep growers usually cannot afford the manpower or the time to maintain a constant vigilance or actively hunt these predators.

When domestic dogs are found roaming on sheep land, again the discretion of the operator and the prevailing circumstances determine the outcome. According to Oregon Revised Statute 609.150, the farmer has the right to shoot a dog only if it is actually engaged in chasing, injuring, or killing livestock.[12] However, it appears to be a common practice to kill dogs at any time they are observed on the premises. Because of the time and expense involved in locating the dog owner and taking the person to court if necessary, or the potential economic loss that may ensue should the farmer not stop the dog when the opportunity is there, shooting is the preferred option. The sheep owner is rarely able to recoup the full value of his lost investment; hence, it behooves him to prevent the loss from occurring.

Realistically, the fencing practices of the sheep growers in Benton County do not represent a deliberate effort to keep predators out. Typical fencing consists of four feet of large mesh woven wire, topped by one or possibly two strands of barbed wire, and set with steel

or wooden posts placed at one rod (5.029 m.) intervals. During the winter grazing of feeder lambs on leased crop land, temporary fences consisting of only woven wire are used where permanent fencing does not exist. There is general agreement that a determined coyote has little trouble getting through most existing fences used by growers within the county. In spite of having a relatively small effect on the coyote, a well maintained fence of the type formerly described does seem to pose a partial deterrent to dogs.

Shifting the flock to prevent attack may consist of bringing the animals into a protected corral, either on a nightly basis or just during the period of lambing, or moving the animals to another pasture when excessive predation occurs in a particular area. Neither practice was found to be used to the point that a significant curb on predator activity for the county could be attributed to this type of preventive measure.

Currently a small amount of trapping is being done by some of the farmers, but for the most part the job is left to the federal trapper. On isolated occasions, traps may be set for the purpose of catching a dog that has been responsible for sheep damage, in that trapping of domestic predators is out of the legal jurisdiction of the Division of Wildlife Services.

Before the 1972 federal restrictions on toxic chemicals for predator control (see page 35 for an explanation of Executive Order 11643 and EPA Pesticide Regulation Notice 72-2), it was not uncommon for private operators in Benton County to implement varying degrees of predator control through poisoning on their own land. This practice included 1080 bait stations, coyote getters, and the general broadcasting of poisoned baits. As a result of the restrictions, it is presently more difficult for the private operator to obtain sufficient amounts of poison, consequently this type of private control has declined considerably.

Predator Control Services by the Benton County Dog Control Board

In existence since 1961, the Benton County Dog Control Board's principle contributions toward reducing sheep losses due to dogs is dog licensing, the enforcement of county ordinances concerning dogs at large, and the picking up of stray animals. These services are implemented by two dog control officers who are under the direct supervision of the Board.

An ancillary service administrated by the Dog Control Board, which is not a direct control measure but assists in lessening the economic impact of sheep loss, is the county reimbursement program. The program will pay the farmer effected approximately one-half of the current

assessed value of a sheep that is killed by a domestic dog whose owner cannot be identified (Table 6). If an owner is located, then in accordance with Oregon Revised Statute 609.140, "Right of Action by Owner of Damaged Livestock," he is liable for payment of twice the market value of the lost sheep to its owner, and county reimbursement would then not apply.[13] The Dog Control Board does assist the farmer in locating the responsible dog owner.

TABLE 6.--ASSESSED VALUES UPON WHICH 1974 REIMBURSEMENTS ARE BASED

Lambs and wethers	$24.00
Ewes, 1 to 6 years	24.00
Rams, 1 to 6 years	36.00
Ewes and rams, 6 years and over	8.00

Note: If the animals are registered, an additional fifty percent is added to the above values.

Source: Department of Assessment and Taxation, Benton County, Oregon

To receive reimbursement, the sheep owner must first have a dog control officer verify that a dog was actually responsible for the kill, as losses to a wild predator do not come under the program. A claim is then filed and payments are made with funds derived from dog license fees. The Board meets and makes payments once a month.

Despite this opportunity for the grower to partially recoup the value of his lost investment, participation in the program is not complete. Many growers prefer to write off the loss rather than take the time and effort to follow up on each kill. Some growers are inclined to only file a claim when the losses are extensive.[14] This inclination is confined predominantly to the larger scale operators as any loss may be considered extensive by the small flock owner.

Predator Control Assistance Provided by the Division of Wildlife Services

Predator control assistance provided to the sheep growers in Benton County by the Division of Wildlife Services is accomplished through a resident District Field Assistant (trapper). The trapper program is one of a number of products stemming from a cooperative effort by the federal, state, and county governments to control animal damage problems in Oregon. This effort is organized by the Oregon Interagency Predator and Rodent Control Committee whose membership is composed of representatives from the State Department of Agriculture, State Game Commission, Oregon State University Extension Service, Association of Oregon Counties, and the Division of Wildlife Services. The various programs implemented by this committee are financed primarily on a scheme of reimbursement whereby all costs

are initially paid from federal funds. Each cooperating participant then assists in reimbursing the federal account by paying a predetermined portion of the costs. To gain the services of a trapper, a county must first become a cooperating member by annually paying its prescribed portion of the expense which was $7,193.00 for Benton County in 1973.[15] Twenty-five counties participated in the program during 1973. The other fund contributors are the State Department of Agriculture, State Game Commission, Harney and Malheur Grazing Board Districts, Malheur National Wildlife Refuge, State Board of Forestry, private timber industries, livestock associations, and the Bureau of Sport Fisheries and Wildlife. As mentioned previously, from July 1971 until July 1973, Benton County withdrew from the program and, consequently, was without a trapper until local pressure on the County Commission by farm representatives resulted in a renewed membership.

It should be noted that although a principle thrust of the trapper's effort in Benton County is directed toward the control of wild predator damage to the sheep industry, the scope of his responsibility includes controlling any type of damage caused by wild mammals or birds. The trapper's services are available to any county resident without charge to that individual and the trapper cannot initiate control procedures on private land without first being requested to do so by the owner.

FEDERAL CONSTRAINTS ON THE USE OF PREDACIDES AS A MEANS OF CONTROL

On February 7, 1972, Executive Order No. 11643, "Environmental Safeguards on Activities for Animal Damage Control on Federal Lands," placed an immediate halt on the use of certain chemical toxicants for controlling predatory mammals and birds on all federal land.[16] The order also prohibited federal participation in the use of such toxicants on both public and private land, as in the case of the trapper's services on private farmland. Subsequent to this action, the EPA issued Pesticides Regulation Division PR Notice 72-2, March 1972, which suspended the registration of all predator control products containing sodium monofluoroacetate (Compound 1080), sodium cyanide (used in the M-44 device), and strychnine.[17] The suspension was instituted because of the environmental hazard imposed by the unrestricted use of these toxicants.

Prior to the "poison ban," all of the aforementioned toxicants were in common use within Benton County, both by the federal trapper and by some individual growers who would carry out their own poisoning campaign. Excluding an apparently small minority of farmers who are still putting out strychnine laced baits, only a limited number of M-44 devices, implaced by the trapper under an emergency provision of Executive Order 11643, represent the current degree of predacide use in the county.

UTILIZATION OF THE M-44 IN BENTON COUNTY

The M-44 is a spring operated device that ejects a small pellet of sodium cyanide into the victim's mouth when a scented triggering mechanism is activated by the investigating animal (Plate 7). It has essentially replaced its predecessor, the "humane coyote getter." Proponents for the M-44 ascribe several main advantages that this device has over the traditional leg-hold steel trap. It can be placed directly in the pasture without interfering with grazing stock; it is generally more humane, killing the animal quickly; it tends to be more canine specific, thus decreasing the number of non-target species affected; and, the M-44 has a greater reliability in weather conditions that are adverse for trapping.[18]

Not withstanding the provisions of the federal legislation against the use of M-44s, Section Three of Executive Order 11643 allows for the emergency use of a chemical toxicant by a trained federal representative under such conditions where non-toxic control is ineffective and where implementation of control is deemed essential by the head of the applicable federal agency. The criteria for the use of M-44s by the Division of Wildlife Services for the purpose of mitigating an "emergency" situation resulting from excessive coyote predation on sheep or goats only, has been established by the Bureau of Sport Fisheries and

PLATE 7.--M-44 Device

PLATE 8.--Red Fox Trapped in Steel Leg-hold Trap

Wildlife through an interagency memorandum agreement. The following guidelines are those provided to the trapper for the purpose of determining whether an "emergency" situation exists and whether the use of M-44s are warranted:[19]

> Emergency requests will be considered only for sheepraising areas where aerial or other non-chemical control methods are not feasible or effective. An emergency shall be held to exist when there is an unusually high rate of predator loss to one or more growers equal to 2 percent or more of the affected flock over a seven-day period. The emergency criteria may be satisfied when a lesser rate of predator loss occurs which can be projected to cause the destruction of 8 percent or more of the affected flock over the growing season, after trapping, shooting, and other non-chemical controls have been attempted over a reasonable period and found ineffective.
>
> In low, open grassy pastures, sheep losses due to predation are more easily located and confirmed. An emergency will be considered to exist in these areas when: a sheep raiser is suffering a demonstrated and confirmed 2 percent or higher loss to predators over a period of seven days; when mechanical methods have been unsuccessful for a fourteen-day period and the losses suffered by the grower due to predation have reached an average of 0.6 percent per week or more for that period; or when mechanical control methods have been unsuccessful for twenty-eight consecutive days and the losses suffered by the grower due to predation have reached an average of 0.4 percent per week for that period.
>
> In heavy brushy areas or rough, steep terrain, sheep and lamb losses due to predation are not easily located and confirmed. Research has documented the extreme difficulty in locating more than 50 percent of all losses in areas of this type. An emergency will be considered to exist in this situation when a sheep grower suffers a confirmed loss of 1 percent or higher during a seven-day period; when mechanical control methods have been unsuccessful during a fourteen-day period and losses suffered due to predation have reached an average of 0.3 percent per week or more for that period; or when mechanical control methods have been unsuccessful for a twenty-eight-day period and the losses suffered by the grower due to predation have reached an average of 0.2 percent per week or more for that period.

Operating under these guidelines, the trapper for Benton County currently has thirty-eight devices in use on six different farms which are considered to be separate emergency situations. At the time of this writing, the thirty-eight M-44s had not been in their respective locations long enough to note their effect in reducing the problem. The following is a case example of one of these six "emergencies," as submitted by the trapper to the Regional Director, Animal Damage Control Office, Division of Wildlife Services, who has the authority to approve the use of the M-44 without further consultation with the Secretary of the Interior, or other agencies:

a) Amount of land involved -- 100 acres.

b) Number of confirmed losses due to coyote -- 10 ewes and 5 lambs.

c) Time period over which these losses occurred -- June 1 to August 10 (71 days).

d) Total number of sheep from which the losses were taken -- 100 animals.

e) Controls implemented without success - steel traps.

f) Description of predation site -- pasture adjacent to brushy area.

g) Other factors noted -- trapwise coyote.

THE EFFECTIVENESS OF MECHANICAL PREDATOR CONTROL MEASURES IMPLEMENTED BY THE TRAPPER

The current Division of Wildlife Services representative has only been operating in Benton County since its 1973

renewal of memberhsip in the state's cooperative predator control program. During the fiscal year of 1973, the trapper estimated that he had taken 100 coyotes, thirty to forty foxes, two bears, and "a few" bobcats in steel traps and snares (Plate 8) (considering those efforts directed toward sheep predators only). Furthermore, many non-target animals such as raccoons, oppossums, skunks, and domestic dogs were also caught. The trapper noted that the non-target animals are released, if in good condition, in accordance with the Division's policy. However, with approximately 130 trap sets situated throughout the county, the trapper is only able to visit each set once a week which results in many animals succumbing to exposure before being found. During the characteristic dry summer months, trapped animals will desicate and die within a day or two; hence, the extended period between trap checks significantly reduces the humanity and selectivity of this predator control effort.

In addition to the imposed restrictions on the types of control, the trapper is further inhibited in his effectiveness by the pattern and variability of land use in Benton County. In that traps cannot be feasibly set in a pasture with grazing stock, it is often necessary to gain the permission of adjacent landowners to trap on their properties. Conflicting land use interest and environmental philosophies frequently result in the permission being denied. A clear

example of a conflicting interest is evidenced by the timber industry's stand on coyote control. They would prefer, in most instances, that the coyote population not be reduced so as to aid in controlling deer which are destructive to young tree seedlings. With much of the sheep grazing land in the eastern two-thirds of the county interspersed through commercially viable forest land, the trapper is largely confined to the complainant's property in this area.

A related land use factor is that the trapper is not permitted to trap on public land without the express permission of the agency in charge. Within Benton County, this would include Bureau of Land Management land, Siuslaw National Forest, McDonald State Forest, and William L. Finley National Wildlife Refuge. The trapper has attempted to gain permission to trap for coyote in Finley Refuge and McDonald State Forest as these wooded areas are deemed "avenues" into adjacent valley sheep land where the coyote can make destructive forays and return to the nearby sanctuary. At present, the permission for either area has not been granted. The manager of Finley Refuge states that although it is conceivable that the refuge may allow coyotes access to adjacent open grazing land, it is doubtful that this occurs to any great extent. There is only one known family of coyotes that frequent the refuge area, of which

there is no evidence to indicate that they are responsible for any stock loss, and transit coyotes would be trespassing on the territory of this family. The manager also feels that the trapper's role is to get the guilty animal through trapping on the predation site, and not indiscriminately reduce the general coyote population by trapping in other locations.

Unlike many areas in the western United States that have all land directed toward livestock production with a common land use objective and philosophy shared by all residents, Benton County lacks this homogeneity that would greatly facilitate predator control. A pervading feeling exists among many residents of Benton County, including a few sheep owners, that killing the coyote is not only ecologically destructive, but an endangerment to a part of our natural heritage; hence, they resist having any sort of control devices placed on their property.

The trapper states that although he is impaired by the aforementioned factors, he is usually able to eventually eliminate all guilty wild sheep predators. He notes that the need for more effective control measures lies in reducing the number of losses that occur before the responsible predator is stopped.

CONCLUSION

The objective of this study has been an impartial investigation and report on the problem of sheep depredation in Benton County. In keeping with this theme, it is deemed inappropriate to inject judgments or draw formal conclusions; instead, several observations, based on this research experience, are put forth for consideration:

1) Current control measures are successful only in maintaining a level of effectiveness that progresses from a high risk circumstance for a small flock owner to a minor irritant to the large-scale operator.

2) There is a definite need for statistical information regarding predation patterns which can only be achieved through a centrally controlled scheme of continual monitoring and not on a survey-as-need basis.

3) It is proposed that the essential reasons for the failure of the past data gathering efforts in Benton County were:

   a. The grower is not adequately informed or convinced of the necessity or resulting benefits of such information;

   b. there is some feeling that revealing such information may provide tactical ammunition to the hard-line environmentalist who has

already contributed to the elimination of many predator control measures used in the past;

c. there is a tendency for some growers to pad the reports so as to positively reinforce the sheep owner's position regarding predator control;

d. considering the perceived level of enthusiasm, the local maintenance of such a project is too costly to be competitive with other budget priorities.

It is hoped that this effort will inspire further research into this problem and aid in demoting the current tendency to pass relevant legislation based on superficial and often inaccurate information.

FOOTNOTES

1 Oregon, State Department of Agriculture, Informational Report in Support of the Application for Registration of Sodium Cyanide for Restricted Use for Predator Control within the State of Oregon (Salem, Oregon: June 1974), 65 pp.

2 Oregon State University, Agricultural Extension Service, Commodity Data Sheet - Sheep, Lambs, and Wool (Corvallis, Oregon: Oregon State University, 31 October 1972).

3 Compiled by the Benton County Department of Assessment and Taxation.

4 Interview with Harold Werth, Benton County Agricultural Extension Agent, Corvallis, Oregon, 24 October 1974.

5 Interview with Dean Le Clerc, County Trapper, Linn County, Oregon, 18 September 1974.

6 Walter E. Howard, "Statement before the Subcommittee on Environment of the Senate Commerce Committee, United States Senate," 10 May 1973, p. 6, Appendix 20 in Oregon, State Department of Agriculture, Informational Report in Support of the Application for Registration of Sodium Cyanide for Restricted Use for Predator Control within the State of Oregon (Salem, Oregon: June 1974).

7 Warren W. Aney, Wildlife of the Willamette Basin, Present Status (Portland, Oregon: Oregon State Game Commission, 1967), p. 28.

8 Aney, op. cit., footnote 7, p. 29.

9 Compiled from records of the Benton County Humane Society.

10 Howard, op. cit., footnote 6, p. 9.

11 Interview with Jim Hathaway, Sheep Producer, Benton County, Oregon, 26 September 1974.

12 Oregon, Oregon Revised Statute 609.150 - Right to Kill a Dog that Kills or Injures Livestock (1973).

13 Oregon, Oregon Revised Statute 609.140 - Right of Action by Owner of Damaged Livestock (1973).

14 Interview with Edna McDowell, Secretary, Benton County Dog Control Board, Corvallis, Oregon, 4 October 1974.

15 U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Division of Wildlife Services, Annual Report, Fiscal Year , Oregon (Portland, Oregon: 1968 - 1973).

16 U.S., President, Executive Orders, "Environmental Safeguards on Activities for Animal Damage Control on Federal Lands," Federal Register 37, No. 11643 (9 February 1972) p. 2875.

17 U.S. Environmental Protection Agency, Pesticides Regulation Division, PR Notice 72-2 (Washington, D.C.: 9 March 1972) 9 pp.

18 Oregon, State Department of Agriculture, op. cit., footnote 1, pp. 46-48.

19 Inhouse directive provided to the Benton County District Field Assistant by the Division of Wildlife Services, Portland, Oregon.

(APPENDIX)

Livestock & Poultry Predator Injury & Loss Report

Livestock Owner's Name _____

Address _____

Date(s) Incident Occurred _____ Time of Day _____

Date this report prepared _____ Enumerator _____

Class of livestock or poultry involved _____

Total number of these animals on the farm _____

Number killed _____ Number severely injured _____

Number with light _____ or undetermined injuries _____

Owner's estimate of fair market value of loss $ _____

Other costs assessable to the damage $ _____

What predator caused the damage? _____

Was more than one predator involved? _____ Number _____

If the predator was a dog(s), is the owner(s) known? _____

Owner's name _____

Has the predator(s) been killed or caught? _____ What date? _____

(Underline all words that describe the situation in the following paragraph.)

Was the predator seen, heard, identified from tracks, scat, from other signs, by kill or injury pattern, in some other way (describe on back)?

Who made these determinations: livestock owner, enumerator, other (name) _____

_____

What has or will be done to protect the livestock from further damage? _____

_____

Has this loss been reported to some group or agency? _____ If yes, who _____

_____

SEE BACK OF SHEET FOR INSTRUCTIONS

Completed reports should be given to a director of the Benton County Livestock Association or can be mailed or taken to the Benton County Extension Office, P. O. Box B, Corvallis, Oregon 97330, which is acting as a central collection point for these data.

Use this side to write comments. Comments will be particularly useful if some answers need qualifications or unusual circumstances are involved. Also, comment and qualify if uncertain about any of the answers given.

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