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DO LIVESTOCK GUARDING DOGS LOSE THEIR EFFECTIVENESS OVER TIME?

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ABSTRACT: Information about the effectiveness of livestock guarding dogs for reducing coyote predation on sheep was gathered from livestock producers in the Animal Damage Control Livestock Guarding Dog Program and in Colorado. Eighty-two percent of the producers contacted reported that the performance of their dogs remained the same or improved during 1993 compared with previous years. Eighteen percent of the producers reported a decrease in their dog's effectiveness, but most still felt the dogs were a benefit to their livestock operation. Most producers who noted a decrease in effectiveness attributed it to an apparent increase in the number of coyotes and/or an increase in their predatory activities on livestock.

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INTRODUCTION

Livestock guarding dogs have been used on an increasing number of ranches and farms throughout the U.S. for the past 15 years to protect sheep, goats, cattle, and other livestock from predation. From the outset of research and use of guarding dogs, there was speculation by some that, even if dogs were initially successful in reducing predation, coyotes (*Cams latrans*) and possibly other predators, would eventually learn to circumvent the dogs and continue killing livestock. This line of thinking probably stemmed from the coyotes' reputation of "outsmarting" many of the control tactics used against them.

A recent article titled, "Coyotes forming packs to deal with guard dogs" appeared in several western newspapers and supports that earlier speculation. The article stated that some coyotes "have developed sophisticated new strategies to deal with guard dogs." Continuing, the article indicated that coyotes are forming packs that are simply no match for guard dogs, they're dividing up to divert the guard dogs, or they are simply wearing the dogs down through exhaustion.

In this paper we present data on changes in effectiveness of livestock guarding dogs and discuss factors that affect the performance of guarding dogs. Whether or not coyotes have developed new strategies to handle guarding dogs will be alluded to, but elaboration on that point will not be productive without further research.

METHODS

Information used in this report was obtained from sheep producers who participated in the Animal Damage Control (ADC) Livestock Guarding Dog Program (Green 1989, Green and Woodruff 1990), a partially completed 1993 Colorado State University (CSU) survey of livestock producers in Colorado, and from discussions with sheep producers at workshops and conferences. Data from 36 of the 100 dogs that began in the ADC dog program in 1987 were used for this report. The remaining dogs either died, were culled, or disappeared. The

performance of the dogs was assessed by the producers who used them (Green and Woodruff 1990). Producers were asked whether their dog(s)' recent performance when compared with the past several years remained the same, was better, or was worse.

RESULTS

ADC Program Guarding Dogs

Most of the range producers who received a dog in the ADC Livestock Guarding Dog Program acquired additional guarding dogs on their own. Their assessment of guarding dogs, therefore, was based on the use of guarding dogs in general, not necessarily on the performance of a single dog. By contrast, all but one of the pasture operators in the ADC dog program used only one guarding dog.

Fifteen of the thirty-six (42%) dogs in the ADC dog program were used on rangeland with herders, four (11%) on rangeland without herders, and seventeen (47%) on pastures. On herded range conditions, eight (53%) of the producers reported that their dogs' performance was worse than in previous years. Three (20%) were better, and the performance of four (27%) remained the same. On unherded range, one producer reported worse performance, one better, and two the same. On pasture conditions, the performance of two (12%) dogs improved, and the rest (88%) stayed the same. There was no indication that changes in performance were related to the breed of dog.

Two producers in the ADC dog program who reported poorer performance in their dogs stated that it seemed coyotes had learned to "work" or circumvent the dogs. Three producers said there were "too many coyotes" for the dogs to handle. Two said that limits placed on ADC's ability to do predation control on federal lands contributed to the poorer performance of the dogs. We infer from this statement that there were too many coyotes for the dogs to handle. Three producers said the dogs helped, but were simply not able to adequately protect the sheep in the face of an increased number of coyotes. One producer in Wyoming said his

dogs were facing the "highest coyote population in 30 years."

Guarding Pops In Colorado

In Colorado, sixteen of twenty-five (64%) producers using guarding dogs primarily on open range indicated that their dogs' predator control performance did not change from past years, three (12%) said their dogs improved, and six (24%) said their dogs' performance worsened. Thirty-three of fifty-two (63%) producers using guarding dogs primarily in fenced pastures said their dogs' predator control performance did not change from past years, thirteen (25%) noted improvement, and six (12%) said their dogs got worse. Twelve of fourteen (86%) producers using guarding dogs on open range and in fenced pastures or who maintained their sheep in feedlots said their dogs' predator control performance did not change from past years, whereas two (14%) said their dogs became worse.

Most of the sixteen producers in Colorado who reported an improvement in their dogs' predator control performance related the improvement to the dogs becoming more mature. Half the producers grazing sheep in fenced pastures (three of six) and half of those grazing sheep on open range (three of six) and reporting decreased effectiveness of their dogs, related the decrease to increased number of predators (two), predators learning to outsmart the dogs (three), or both (one). The other six producers who reported decreased effectiveness of their dogs related the decreases to factors that we do not consider the fault of the dogs such as old age (three), less care given by producers in raising dogs (one), not enough sheep to keep the dog interested (one), and a female guarding dog in heat that attracted other dogs that killed sheep (one). Even though fourteen producers indicated their dogs were less effective now, five (36%) still rated their dogs' predator control performance as excellent, three (21 %) as good, five (36%) as fair, one (7%) as fair to poor, and none as poor or unacceptable.

Overall, 82% of the producers contacted in this study reported that the performance of their dogs remained the same or improved during 1993 compared with previous years. Eighteen percent of the producers reported a decrease in their dog's effectiveness. Using Chi Square procedures, there was no significant difference between the ADC program producers and the Colorado producers in the proportion of dogs whose performance over time remained the same, became worse, or became better.

DISCUSSION

The reported percentage of livestock guarding dogs that work effectively has ranged from 66 % to 90% (Green 1989, Green et al. 1984, Green and Woodruff 1988, Andelt 1992). Effectiveness can vary among breeds (Green and Woodruff 1990) and likely is dependent on other factors including: 1) how the dogs were raised, 2) the habitat and topography of the grazing area and whether the grazing is on rangeland or in pastures, 3) the density and type of predators, 4) the availability and type of prey, 5) the number of dogs used, 6) the behavior of the livestock, and 7) the mix of other methods used to manage predation. The interaction and potential for synergism among these and other factors make it difficult

to accurately predict the effectiveness of a dog or dogs. Likewise, it is sometimes difficult to accurately determine the reason or reasons a particular dog is not successful.

It is also important to understand that effectiveness is a relative term. Some dogs completely stop predation while others only decrease it. Whether the decrease is sufficient to consider the dog a success is somewhat subjective and must ultimately be determined by the livestock producer. Therefore the fact that a coyote kills a sheep in a flock protected by a guarding dog can be viewed as a failure or a success (i.e., the coyote did not kill multiple sheep) depending on one's perspective.

We will discuss some of the factors that influence the success of guarding dogs in light of information gathered from producers who have used them. The ideas presented represent a collection of information based on actual experience and professional conjecture. Although the topics are addressed singly, they are interrelated.

Grazing Conditions

Management practices and conditions on pasture and rangeland differ and influence how guarding dogs are handled and work (Green and Woodruff 1993). Whether a dog is working on pasture or rangeland likely influences its effectiveness. Coppinger et al. (1988) reported that the effectiveness of guarding dogs for reducing predation did not vary significantly between fenced pasture and range operations. Some of the data examined for this report, however, show a higher percentage of dogs on range with reduced effectiveness than dogs on pasture operations. Some of the decrease may be due to increased predation pressure. Nevertheless, most producers in the ADC dog program and in the CSU survey who reported decreased effectiveness were still satisfied with their dogs.

Almost all producers in the ADC dog program and in Colorado who graze sheep in pasture settings continue to be pleased with the performance of their dogs. There has been no apparent decrease in the effectiveness of ADC dogs which have been used in pasture settings since 1987 or 1988.

Predator and Prey Density

Some producers reported that the decreased effectiveness of their guarding dogs was a result of the dogs being "overrun" by coyotes. Coyotes may have become bolder or their number, and thus the frequency of their encounters with dogs, may have increased in some areas. Producers asked to describe what they observed in these instances generally report that there are simply too many coyotes for the dogs to deal with. One producer reported that coyotes apparently ganged up on one of his dogs and wounded it so severely that it died. One reported that his dog got "whipped" by coyotes and then was reluctant to go back out with the sheep. A few producers stated that their dogs are just worn out by the amount of territory they cover trying to keep the coyotes out.

It appears that when a number of coyotes attack a band of sheep simultaneously at different sites, some are successful in making a kill because the dog or dogs are at another location dealing with other coyotes. In these situations of high coyote density, some coyotes may

indeed be learning how to decoy the guard dog and kill sheep at the other end of the band.

Coyotes may be increasing their predation pressure on livestock because alternate prey is less available. It is reasonable to expect predation pressure on livestock to increase when availability of native prey for coyotes decreases. Ranchers and sportsmen in Wyoming reported in recent public meetings regarding predator control that populations of wildlife normally killed by coyotes (e.g., lagomorphs, ungulates, birds) are scarce in some areas.

Maturity and Longevity of Dogs

Both maturity and longevity influence the long-term effectiveness of guarding dogs. Dogs in their prime are often quite effective, whereas pups, adolescents, and old dogs provide less benefit. In addition, the longer an effective dog lives, the more cumulative benefit it provides.

The ability of a dog to boldly confront and repel predators is strongly influenced by its age and physical maturity. Most experts agree that dogs of guarding breeds reach physical maturity at approximately two years-of-age. Younger dogs may display appropriate guarding traits and may reduce or even eliminate predation under some circumstances. However, when facing aggressive, persistent, or numerous predators, a guarding dog's physical and behavioral maturity is important, both for the dog's own safety and its effectiveness in protecting livestock.

Bringing a dog to full maturity and effectiveness requires a significant investment of time and resources. Purchase price as well as the costs of transportation, maintenance, and replacement constitute a substantial financial investment (Green et al. 1984, Lorenz 1985). Replacement cost is also an important factor when considering longevity in working dogs. Lorenz et al. (1986) reported 50% of dogs working on farm/ranches died by 38 months-of-age, and 50% of dogs on ranches died in their first 18 months. They concluded that early death reduced effectiveness and raised the costs of using guarding dogs.

Longevity of the ADC dogs in our study was better than that reported by Lorenz et al. (1986); 61 of 100 dogs survived their first two years. During following years, mortality slowed to an average loss of 6.3 dogs per year, or 6.3% of the original cohort. By the end of the fourth year, fewer than half the dogs were alive, and after six years, 36 remained. Using this information, it appears there is a 39% chance the average guarding dog user would be forced to replace a dog within its first two years of life and a lesser chance in succeeding years.

It is reasonable to presume a decline in effectiveness at some point in time as dogs become older. The decline may be gradual or abrupt depending on circumstances. It is also reasonable to expect fewer years of effective performance from dogs that live and work under rigorous conditions. For example, one would expect a dog that works year-round on open range, traveling miles each day, sometimes in inclement weather, and frequently encountering and rebuffering predators, to have a shorter effective life span than a dog working in a relatively

small pasture, requiring little travel, and confronting relatively few predators. It is difficult to predict how many effective years a guarding dog will provide, but it's clear that at some point, each dog that lives long enough will become ineffective due to old age.

Number of Dogs

With few exceptions, most of the range sheep producers who received one or two dogs in the ADC Livestock Guarding Dog Program, have since purchased additional dogs, indicating high approval of guarding dogs. One producer in Wyoming now has twelve dogs and runs three dogs per band of sheep. He reports that he would not be able to stay in business without the guarding dogs. He still relies heavily on the services of the ADC program as well and affirms the need to have an integrated approach to managing predation.

A sheep producer in western Colorado experienced with using guarding dogs reported moving sheep onto a private 6,000-acre allotment. The area had not been grazed by sheep nor had any predator control work been done on it for over 20 years, and no livestock had been on the range for seven years. The terrain consisted of lower elevation rangeland and progressed up in elevation to timberland. Coyotes were reported to be numerous as evidenced by sightings and hearing their howls.

In 1992, 1,600 ewes were grazed from October through November with a herder and six guarding dogs. Although no data are available on the precise number of sheep that were killed by predators, the producer considered the loss to be minimal.

In 1993, 960 ewes and 1,193 lambs went onto the allotment in early June and stayed until October. Again, a herder and 6 adult guarding dogs accompanied the sheep through August, and losses to predators appeared to be minimal as in the previous fall. Two female dogs were removed from the band in late August because they came into heat. The herder reported an immediate increase in coyote kills after the two dogs left. A final count at the end of the five-month grazing period showed a loss to all causes of 5 % of the ewes and 4 % of the lambs. The lamb count covered the period from docking until the lambs were trucked off the allotment.

Along with the band in 1993, 552 ewe lambs from another operation were grazed with the sheep. At the end of the grazing season, 549 of the ewe lambs were counted off the range.

Although some sheep were lost to coyote predation in this instance, the producer was very pleased that the number was kept so low, a fact the producer attributed to guarding dogs. Terms of the grazing lease prohibited any lethal predator control, so guarding dogs were the sole protection offered. It remains to be seen whether similar results will be noted in future years.

It appears that putting additional guarding dogs with a band of sheep offers an increasing degree of protection from coyote predation. Most producers who use guarding dogs with range bands use two to three dogs per band, but some use more. A producer from Wyoming noted that there comes a time when one must question the benefit of adding more and more dogs. At some point, a large number of dogs may become unmanageable.

Other Forms of Predator Control

In addition to guarding dogs, the sheep producers in the ADC guarding dog program used a multitude of methods to manage predation. Throughout a typical year these methods included herders, fencing, night confinement, shed lambing, scare devices, and the services of ADC specialists. Not all producers used every method, but they all used several in addition to dogs. We and others have long advocated that a mix of control methods is the best approach to keeping predation minimized. Every method has limitations, and no single method used alone has ever been universally effective in preventing predation. As indicated by many of the guarding dog users in this study, dogs are no exception. They work better in some situations than in others.

CONCLUSIONS

Livestock guarding dogs generally have been rated effective in reducing predation on livestock. However, for many livestock producers, guarding dogs alone are not able to keep coyote predation on sheep within acceptable limits. Where the effectiveness of dogs has decreased from a previous level, common elements emerge. Most of the decreases have occurred on open range conditions with a presumed increase in coyote density. While the overall effectiveness of dogs is not necessarily decreasing over time, there are circumstances where guarding dogs alone are not sufficiently effective.

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