Livestock-Big Game Relationships: Conflicts and Compatabilities

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Abstract

Competition between livestock and wild ungulates is an ongoing concern of both wildlife biologists and livestock operators. Scientific evidence for competition is scarce. Even if two species share similar food habits, competition does not occur unless those food resources are in limited supply and in using those resources one species causes a decline in population performance of the other. The potential for competition is influenced by incomplete or compressed habitats resulting from such things as weather changes, human activities and animal densities. Minimizing the potential for conflicts between domestic and wild ungulates may be antagonistic or harmonious in approach. Antagonistic methods have historically been the methods of choice. These methods usually involve forceful attempts such as harassment or trapping and transport to move animals away from the area of concern. Another approach is to consider wild ungulates a part of the overall system and then develop management plans accordingly. Most western states' wildlife agencies have programs that provide assistance to landowners. Future problems involving wild and domestic ungulate relationships include the role of herbivory in post-disturbance succession, forest health and foraging habitat quality.

Introduction

Landowners, land managers and researchers have long been concerned with the concept of competition between livestock and native ungulates. In 1943, Pickford and Reid in the Journal of Wildlife Management voiced concern over livestock–elk competition on the Whitman National Forest in northeastern Oregon. In their article, they summed up the situation quite well. "It is well known that elk and livestock compete for forage...but the nature of this competition has been described largely by conjecture because specific information is meager." In the 1950's several articles in the Journal of Range Management addressed the issue for various states in the West. Has anything changed? Lonner and Mackie (1983) stated, "...It (competition) remains largely an issue of conjecture." These same authors found that most competition studies showed better evidence for coexistence and adaptability. Recently, some authors have termed livestock grazing as the most pervasive land use that has greatly degraded wildlife habitats. Conversely, livestock operators complain that big game grazing on private lands affects their ability to maintain livestock production. While deer numbers have declined in much of the West in the last 25 years, elk numbers are at an all time high. What is known is that rangelands in the West support a large number of ungulates (livestock) that did not evolve with the vegetation and a large human population with concomitant land use incompatible to wildlife. Competition and loss of habitat remain important topics of discussion on both private and public lands.

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Presented in "Grazing Behavior of Livestock and Wildlife." 1999. Idaho Forest, Wildlife & Range Exp. Sta. Bull. #70, Univ. of Idaho, Moscow, ID. Editors: K.L. Launchbaugh, K.D. Sanders, J.C. Mosley.

What is Competition and Can it be Quantified?

Free-ranging herbivores are faced with the dilemma of extracting sufficient nutrients from rangeland vegetation to meet their minimum requirements for growth and reproduction. The forage base is frequently limited in amount and constantly changing in quality. Various species of herbivores have evolved to meet their specific nutrient requirements by adapting feeding strategies that tend to optimize levels of nutrient intake, and minimize feeding time (important where predators are a factor). In the process of food selection and rejection, herbivores influence structure and composition of vegetation, potentially influencing their own population dynamics and those of sympatric herbivores. Theoretically, sympatric herbivores with similar food habits will compete and those that have dissimilar food habits will not. Although competition between herbivores may appear obvious, relationships between herbivores may not necessarily be competitive and may even be beneficial.

Interspecific competition has to be judged on two criteria: 1) two species compete when they share a resource that is present in short supply, and 2) in using that resource, each species reduces the other's population performance to levels below what these measures would be in the absence of the other species. In theory, animals that evolved sympatrically do not compete because one or the other should have gone extinct. Livestock, on the other hand, did not evolve in western U. S. ecosystems so competition with native herbivores is possible. Additionally, if resources are not in short supply then competition does not exist, even between livestock and wildlife. Studies frequently demonstrate dietary overlap among sympatric herbivores, but such overlap may not result in the reduction of population performance of either species. It is no surprise that scientific evidence for the existence of competition among large herbivores is scarce. However, the perception of competition often results in the removal or reduction of livestock from areas considered important to wild ungulates. Livestock operators often observe the presence of deer and elk on private lands and perceive there is a reduction of forage available to livestock. Sportsmen often resent the presence of livestock on areas they hunt and envision that removing livestock would allow increased big game populations. Wildlife and land managers suffer from the criticisms of both groups and because they bear the burden of proper management, often react to that pressure. The bottom line is that whether or not competition can be scientifically proven, people believe it is occurring. For the purpose of this paper, we will make the assumption that it is possible. For a more complete discussion of competition and a list of references from which the previous discussion was drawn see Vavra et al. (1989) and Wisdom and Thomas (1996).

Influencing Factors

What makes competition so difficult to determine? The acquisition of nutrients by herbivores is complex (Provenza and Launchbaugh this volume). In general, large herbivores evolved either to consume large quantities of low quality forage or rely on carefully selecting a diet of higher quality forage but eat less of them (Bunnell and Gillingham 1985). Some herbivores must also minimize their exposure to predation. Generally, larger animals are quantity oriented and smaller animals are quality oriented. For example, horses forage by increasing quantity, while pronghorns are more selective. However, forage availability is the ultimate driver. When resources are in short supply, competition may occur. This is possible during severe winters with extensive snowpack, at the end of winter prior to the initiation of new growth or on long overgrazed ranges with simplistic plant communities. Hanley and Hanley (1982) present an excellent detailed discussion on diet selection.

The major problem with wild ungulates is the human population and concomitant land use practices: agriculture, cities, roads, and all the other trappings of civilization. Wild ungulates once migrated seasonally over wide areas and were able to choose a wide array of habitats depending on season of the year, forage and weather conditions. Wild ungulates now exist in ecologically incomplete or compressed habitats (Vavra and Sheehy 1996, Wisdom and Thomas 1996). Lower elevation spring, fall, and winter ranges are the most affected as many of these are now private lands devoted to agriculture or human habitation. The potential for competition (real or perceived) is highest on these lands.

In most of the western U.S., "average" weather conditions rarely occur; annual variation is the name of the game. The amount and timing of precipitation influences the amount of forage produced, the array of plant species growing, and their nutritional quality. Cold winters with heavy snowpacks can limit the amount of winter range available. Animals that would normally occupy different winter habitats are forced to coexist on limited ranges. Cool springs that delay the initiation of new growth can stall seasonal migration of animals at lower elevations and create areas of overuse. Usually there is a time lag between wild ungulate migration to higher elevations and livestock turn-out that allows vegetation recovery. This may not occur in cool springs with heavy snowpacks when the up-slope migration is delayed. Heavy snow years may also force wild ungulates to nontraditional winter ranges such as hay meadows or croplands like winter wheat. These new areas may then be adopted as winter range in following years even though weather moderates. New habits are formed. The same situation may occur in dry years when animals are forced to search for water. In some areas where late summer forage quality becomes limiting to lactating animals, movement to areas of higher forage quality may occur. Late summer movement by deer and elk to alfalfa fields provides an excellent example.

Increased human activities may force animals to seek new ranges for security. The obvious example is animals moving from areas exposed to hunters to those where hunting is not allowed. On public lands, increased human activity such as commercial mushroom harvest, intense logging, firewood gathering, and recreation coupled with high road densities often drives animals to private lands for solitude.

As with other "land wars", water is often an important consideration in any examination of ungulate competition in the western United States. In the years

following World War II, the Oregon Game Commission and Bureau of Land Management cooperatively built many water holes in the xeric portions of southeastern Oregon (Trainer et al. 1983). These developments made vast tracts of otherwise very marginal rangeland available to wild, feral, and domestic herbivores. Was this work effective at reducing competition or merely spreading it to new areas? Competition at water has been reported between feral horses and pronghorns while coexistence or synergistic benefits have also been speculated. Water developments have traditionally been a significant range improvement for both domestic and wild herbivores. By providing sufficient water in appropriate places, water can be used to shift utilization and decrease competition.

Good range management may even be a cause of competition. Livestock operators often practice rotational systems or specialized grazing systems that use an early cattle entry to condition forage for a later grazing entry. These and other forage and ecological enhancement practices (e.g., reseeding, prescribed burning) may attract wild ungulates to well managed rangeland. On private lands, throw in the "solitude factor" for another attractant. The results are increased big game numbers on lands grazed by livestock and a resultant potential for competition. Immediate access to croplands is another associated problem (Nolte this volume).

Many factors obviously affect interactions between livestock and wildlife. The important point is that competition is a moving target. In some cases, where compatibility appears to be the norm, some event (e.g., weather pattern, reseeding) may shift herbivore use patterns and create a problem where none had previously occurred. It may be temporary or it may not.

As the relative density of deer and elk increases, several events or conditions may increase competition with livestock. The most obvious mechanism is spatial in nature. Crowding prompts increased dispersal, which increases the chance of negative encounters. Forage quantity and quality may also be influenced by changes in relative herbivore density. Even at low densities, sites with desirable forage or in desirable places show signs of heavy use. At very high ungulate densities, some areas are still unused. Active management may be quite effective at temporing either of these situations by influencing the distribution or density of the ungulates.

Several studies have addressed the role or viability of conditioning forage (Anderson and Scherzinger 1975, Vavra and Sheehy 1996, Alpe et al. 1999). The outcome of conditioning forage is ultimately dependent on grazing intensity and herbivore density. Too many or too few animals through a site for too short or long a period may result in a significant departure from the desired preparation for later grazing. Competition may be influenced by population density and potentially diminished through density dependence functions after populations reach high levels. These actions typically impact productivity, survival, and recruitment. What triggers density dependence functions, and even when or how they occur are subject to great debate and personal interpretation. The essence for this discussion, however, is that wild ungulates may demonstrate some form of self-regulation through density dependent functions (e.g., lower survival, decreased calf crops, etc.). Resolving competition conflicts in the future may somehow utilize these natural processes to help relieve conflicts in a more cost-effective manner than current depredation mitigation.

Minimizing the Potential for Competition

Minimizing the potential conflicts between wild and domestic herbivores can be accomplished in a variety of ways. Methods can be antagonistic (e.g., hunting, harassment, trap and transport, exclusion fencing) or harmonious (e.g., adjusting stocking rates, complementary grazing systems, reseeding, salting, feed grounds).

Antagonistic measures have historically been the methods of initial choice. Hazing and harassment of big game animals, setting up traps and transporting animals to low conflict areas, and as a last resort, exclusion fencing have all been used particularly on areas of minimal winter range availability and where croplands abut winter ranges. In some cases, specialized hunts have been effective as a harassment method. Some western state wildlife agencies have damage policies and procedures in place outlining increasingly severe actions to alleviate damage. However, landowner resistance often occurs on the grounds that hunters are a bigger problem than the offending animals.

In some cases, conflict and competition are not really resolved by management efforts to minimize competition, but are merely rotated. Consider an elk population which discovers and invades alfalfa fields in late summer or hay stackyards in late fall or winter. By displacing elk through antagonistic techniques the initial problem is resolved, but a neighbor or another ranch down the road is suddenly subjected to the same problem. Once elk shift their fall or winter use onto agricultural lands, whether through hard winter, displacement, or random chance, they are hard to remove. A domino effect is often put into play with initial efforts of antagonistic management.

Some ranchers have also used heavy grazing with livestock with the attitude that "I'm going to get it before

the elk do" on spring and summer ranges, or that late season use will deny winter range use by elk. These methods seldom work because forage remains in areas that cattle do not use. Also, if timely precipitation and consequent forage regrowth occur, the availability of high quality forage may actually attract wild ungulates.

Quantifying the loss of grazing value due to wildlife on rangelands is a near impossible task. Most importantly, if resource damage is occurring, payments will not improve ecological conditions unless stocking rate adjustments also occur. Payments have to be used by the landowner to acquire additional forage and not just pocketed.

Other methods can be tried. Consideration should be given to the particular needs of the problem wild ungulate. The trick is to deny that species some requirement. Security, usually provided by solitude or cover is probably the requirement of choice. The limitations of denying forage have already been discussed. Denying security might include selective logging of important forest habitat. However, opening a forest canopy may improve forage enough that the animal is willing to compromise security needs to obtain the forage. Even worse, the forage may draw more animals. Harassment of animals using grasslands may move them to cover (forest or rough topography) where harassment is not possible. Areas adjacent to that cover then become more important and animal use may be concentrated in those areas resulting in localized damage worse than what occurred previous to the control attempt.

Providing alternatives, diversions, or barriers to stackyards and alfalfa or other crop attraction is sometimes highly effective at minimizing competition (Nolte this volume). Developing elk feeding grounds is a management option subject to great controversy given the many benefits and detriments. In some cases (for example the White River Management Area in Oregon), elk are fenced from agricultural land and fed through the winter somewhat successfully. At Jackson Hole, Wyoming, every winter an ever-increasing number of elk descend on a finite winter range. Here elk are fed pelleted rations throughout the winter with more controversial results. Brucellosis concerns for elk and neighboring cattle are bringing attention to the area. Staging and dispersal of elk are undoubtedly also causing concern with the owners of homes and ranchettes on land adjacent to the winter range.

Positive approaches to livestock/big game conflicts are possible if the landowner or land manager adopts the attitude that wild ungulates are part of the system he/she operates in. Cooperation with state wildlife managers and public land managers is imperative in developing workable alternatives. In most western states programs are now available to assist landowners in this approach.

Access and habitat enhancement programs are potentially harmonious solutions that are used by several western states to varying degrees. Oregon has such a program in place funded by a $2 hunting license surcharge and revenues from up to 10 raffled tags each for deer and elk. Regional committees with landowner and hunter representation submit project proposals to a state board. Typical projects have included vegetation manipulation, water development, road closures, and fencing. One very desirable aspect of the program is that 75% of the costs can be paid out up-front. Deer and elk tags can be allocated for providing access or improving habitat as well as monetary support. A Green Forage Program is in place to assist landowners experiencing crop damage problems. The Deer Enhancement and Restoration (DEAR) program assists landowners wanting to improve mule deer habitat on private lands. Oregon also has a habitat improvement program funded by Pittman-Robertson dollars, a federal excise tax on arms and ammunition, to improve habitat for wildlife in general. The Green Forage and DEAR Programs are to be dropped if help does not come through the state legislature. Nevada has a rather unique program where a landowner can schedule a cooperative big game inventory with a biologist. A voucher for tags is issued on the spot at the rate of 1 tag per 50 deer or pronghorn. These tags may be used by the landowner or sold for use during the general season. In Idaho, an access program is in place, but is not used extensively. However, damage payments are made in Idaho with the stipulation that access be granted to public hunting. Wyoming has a program in which coupons attached to big game tags are presented to landowners and subsequently cashed in to the state for compensation. A program to feed and attract deer and elk from critical lands towards public and even some private land, is in place in Washington, and is managed by their enforcement branch. Damage hunts are commonly held in lieu of cash payments for damage. Colorado has two special programs: Habitat Partnership Program and Ranching for Wildlife. The first is designed to alleviate livestock-big game conflicts. Local committees develop prioritized lists of conflict areas and then draft, with public input, solution plans. Utilizing earmarked license funds, plans may include habitat improvements, special hunts, fence improvements or repair, or even direct payments. Ranching for Wildlife creates a new value for big game through the exchange of tags (from Colorado Division of Wildlife) for wildlife habitat improvements and limited public access (from major landholders).

Contrary to the European approach to wildlife management, wildlife ownership in the United States is granted to the people and is entrusted to management by the states. In much of Europe, the landowner or a collective of landowners, has responsibility not only for crops, timber, and other commodities, but also for wildlife management, particularly harvest. In this country, one of the most fundamental benefits of our structure is the hunting opportunity provided for all citizens with the interest and at least modest means. In Europe, hunting is essentially restricted to the well-to-do. Wildlife in Europe represent a commodity, and as such become another avenue of income to the landowner. When wildlife provide significant revenue, competition becomes allocation, and frowns turn to smiles. An increasing number of landowners in this country are adapting the European philosophy by charging for the right to trespass. Commensurate with this shift is a general increase in tolerance of depredation by big game.

Controlled livestock grazing can be used to improve foraging habitat available to wild ungulates and may also influence their distribution across the landscape (Mosley 1994, Severson and Urness 1994). Grazing by one herbivore (livestock) modifies the vegetation in such a way that it is more acceptable (compared to untreated areas) to another. Severson and Urness (1994) provide four methods to enhance forage for wild ungulates. Livestock grazing can alter the composition of the vegetation, increase the productivity of selected species, increase the diversity of the habitat by altering structure, and increase the nutritive quality of the forage. Anderson and Scherzinger (1975) provide the hypothesis and a working example. Other examples of application are provided by Vavra and Sheehy (1996), Frisina and Morin (1991), Alt et al. 1992, and Frisina (1992). When a winter range encompasses both private and public lands, a management scheme that treats all properties as one management unit is the most desirable.

Future Issues

It is generally accepted that forests in the interior Northwest are in an undesirable ecological condition due to past practices that include fire suppression, and improper grazing and timber management. These conditions have lead to a high risk of large wildfires (100,000+ acres). In fact, several of these have occurred in recent years and there will undoubtedly be more. After a fire occurs, land management agencies initiate aggressive fire rehabilitation programs. The end result is usually a landscape that has an overabundance of herbaceous cover that provides aggressive competition to shrub and conifer seedlings. Additionally, livestock are generally excluded for a time period to prevent utilization of recovering vegetation. The exclusion of livestock results in grass plants that develop persistent material from previous year's growth (i.e., wolfiness). This old material essentially makes the grasses "herbivore proof" or at least decreases palatability drastically. Native ungulates attempting to optimize diets are forced to search for alternative forages. The result is increased utilization of recovering shrubs in uplands and riparian zones, and potential increased utilization of conifer seedlings. When livestock are allowed to re-enter the burned areas the same problem occurs. Usually, stocking rate is light enough that only small highly preferred areas are grazed. Small patches of high nutrient content forage then occur. These same areas may be grazed heavily in subsequent years while most of the area remains ungrazed and "wolfy".

It is possible to provide carefully controlled livestock grazing to reduce the amount of herbaceous forage present (see Severson and Urness 1994). The most effective livestock use should be in the first half of the grazing season when grasses are still green. Cattle should utilize primarily grasses at this time. The result is a reduction in competitve ability of the grasses so that shrub and conifer seedling growth and survival is improved (Severson and Urness 1994). Additionally, carefully timed livestock grazing can modify grasses so a more palatable and nutritious regrowth component is present for subsequent use by wild ungulates. This should also decrease the use by the wild ungulates of the shrub and conifer component of the landscape. Skovlin et al. (1976) reported increased use of grasslands and decreased use of shrubs by mule deer and elk following cattle grazing on the Starkey Experimental Forest.

One additional option is available on large burned areas. Usually, livestock are returned to burned areas at the same stocking rate as before the burn. Stocking rates are not sufficient to utilize the increased forage production. If other nearby non-burned pastures or allotments are in need of rest for riparian restoration or other concerns, then cattle could be moved over to the highly productive burned areas to provide efficient forage use. Better utilization of the herbaceous component of burned areas should then benefit wild ungulates.

Forests in the West were traditionally subjected to periodic heavy harvest of trees as the primary management objective. Recently, timber harvest has declined substantially. This change in management may have brought about profound changes in important habitat for elk, deer, and summer grazing for livestock as well as the increased fire intensity discussed previously.

Timber harvest has an immediate and dramatic impact on almost all aspects of a forest stand. It immediately increases light reaching understory layers, releases water and nutrients to herbaceous and woody plants, and changes the dynamics of stand and habitat structure. In general, herbaceous species will initially be favored after harvest by increasing density, cover, and yields. Shrub dominance may soon follow on some sites. As succession progresses, understory productivity declines as overstories increase. Most interior Northwest forests now suffer from this condition; too many trees. Both forage quantity and diversity for herbivores decrease. A decline in wild ungulate production and/or redistribution of these animals onto private lands is possible.

Managed forest habitat can be conceptualized as occurring along a successional response curve, because of periodic harvest, that varies temporally and spatially. Elk, deer and cattle may not benefit equally or at the same time along the curve. Wildlife habitat in young to mid-aged stands may be regarded as dynamic and as transitory for a number of species. Although changes occur in forests following harvest, great dissimilarity in results can be expected. Understory release has important implications for herbivore carrying capacity, potential competition among large herbivores, and grazing management plans. Maintaining habitat for large herbivores will require planning harvest with consideration of temporal and spatial relationships of the understory components.

The issue of continued livestock grazing on public lands has important ramifications for the management of wild ungulates. We have already established that controlled livestock grazing is important to wild ungulates through the process of improving forage. Removal of livestock from rangelands will result in a redistribution of wild ungulates to foraging areas where the best array of nutrients is available. This more than likely, will be private land. Additionally, the shrub component, both riparian and upland, on public land may receive increased utilization (see previous discussion). Evidence for this hypothesis exists in the Hell's Canyon Recreation Area where elk winter range is located on vacated sheep allotments. Once the sheep left, elk use declined on the vacated allotments and increased on spring and fall seasonal rangelands that are privately owned and grazed by cattle.

Conclusions

In this paper we have attempted to describe the difficulty in identifying competition between wild and domestic herbivores, describe possible alleviation methods and discuss potential future problems. What is left is the search for solutions. That search has to begin in one place, and that place is where the word "cooperation" is used exclusively. Once landowners, land and wildlife managers, and interested publics can respect each other and discuss the issues, resolution of problems through the development of remedial management plans is possible. Cooperative management plans that incorporate resource areas and attempt to ignore property boundaries may be the best approach. Remember, the problems are not simplistic, and therefore, simplistic solutions may only create new problems. Hopefully, the ideas we presented in this paper can form the basis for discussion and action that will insure ecologically viable landscapes that provide wildlife values and sustainable commodity outputs.

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