

Range Management in Relation to Mule Deer Habitat and Herd Productivity in Utah

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Most of the foothill and mountain ranges of the West are grazed by both deer and livestock. Since range is the basic resource, both deer and livestock are greatly affected by management of the range.

The purposes of this paper are to point out: (a) the effects of livestock grazing on deer habitat and deer herd productivity; (b) the effects of large deer herds on overgrazed livestock range; and (c) range management practices that favor deer habitat improvement.

Heavy unrestricted grazing by livestock in early days profoundly and adversely affected deer habitat. In Utah, cattle numbers were about 360,000 in 1890, reached a peak of 484,000 in 1920, and declined to 413,000 in 1949. Sheep estimates were 2,150,000 in 1890, reached a peak of 2,882,000 in 1901, and declined to 1,381,000 in 1949. These large herds grazing unrestrictedly, particularly from about 1890 to 1920, resulted in widespread depletion of choice livestock forage in Utah and other western range states (Senate Doc. 199). Many ranges are still considered overstocked by range managers.

During this 30-year period of maximum livestock use of the range, deer numbers apparently were low. Early pioneers found no great abundance of game. Following settlement, unrestricted

hunting reduced deer herds until in 1908 the Utah State Legislature prohibited all hunting for a period of 5 years to protect the dwindling herds. Subsequent favorable legislation also enabled deer herds to increase, and by 1930 overpopulations began to appear. A peak population of deer in Utah was reached about 1942, and overstocking was widespread. This dense population of deer in Utah built up chiefly on overgrazed livestock range and contributed to serious depletion of the range.

The question might well be asked: How could such large deer populations build up on depleted range?

Deer Winter Habitat Modified By Livestock Use

Ever since early settlement, foothill areas, which are the deer winter ranges, have been readily accessible to livestock grazing especially for spring, fall, and some winter grazing. Grazing here has been unrestricted and unregulated until the past two or three decades. Consequently, this range has had especially heavy livestock use which has resulted in (1) serious reduction or near elimination of the perennial grasses and palatable forbs, and (2) a large increase in several shrubs and trees, due to reduced competition from herbs and reduced wildfire.

These increasers are low in palatability to livestock but several of them are valuable to deer in winter (Julander, 1955).

Big sagebrush (*Artemisia tridentata*) has increased more than any other shrub in density and distribution on overgrazed livestock range. While not considered highly preferred by deer, it is their "bread and butter" plant and supplies a greater part of deer winter diet than any other species in Utah. It is especially important in midwinter.

Juniper (*Juniperus osteosperma*), another woody plant, has increased widely on overgrazed range in the southern half of Utah. In many areas, its spread has been detrimental to depleted deer winter range because it has crowded out more desirable shrubs. Nevertheless, its increase has resulted in large volumes of emergency feed and effective winter cover for deer. Juniper has primary value as emergency feed and cover in severe winters and during periods of extreme cold.

Various species of rabbitbrush (*Chrysothamnus* spp.) have increased widely on overgrazed foothill ranges. The more abundant species are not considered choice forage, but some are eaten readily—all are used when more palatable plants are not available.

Two species preferred by deer but generally avoided by livestock appear to have increased locally on overgrazed livestock range. These are curleaf mountain mahogany (*Cercocarpus ledifolius*) and cliffrose (*Cowania stansburiana*).

Good deer forage species that have been reduced or weakened

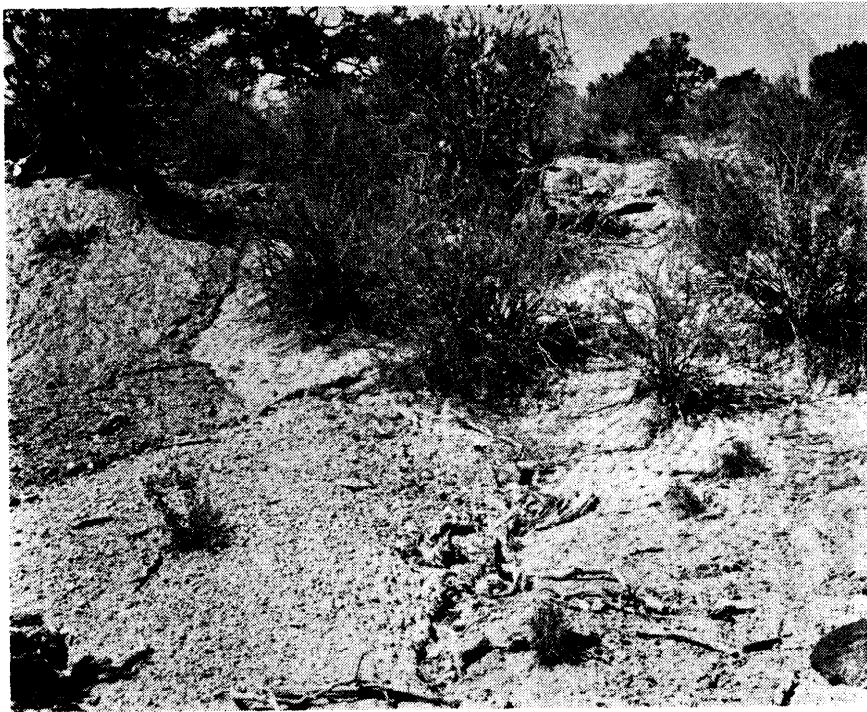


FIGURE 1. Severely overgrazed livestock range may provide browse for deer winter survival or fall use, but lacks herbaceous cover for critical spring forage and for soil protection.

include bitterbrush (*Purshia tridentata*) and true mountain mahogany (*Cercocarpus montanus*).

This large increase in woody plants and the accumulation of their annual growth over many years under light use provided habitat that permitted an extremely high buildup in deer numbers. Peak populations, surviving primarily on low value forage, far exceeded the grazing capacity of the winter ranges. These peaks were probably much higher than could have been reached on virgin range because browse also increased considerably. Excessive stocking of deer, of course, led to drastic depletion of deer winter forage and also added to the problem of maintaining proper ground cover on both intermediate and summer ranges.

With proper stocking of deer, probably the overgrazed livestock ranges of Utah with their increased browse supply could have provided survival rations for a larger winter population of deer than could virgin range or range in good condition for live-

stock—at least for several years. However, shrubs alone, on sites where herbaceous species have been destroyed, appear to be inadequate for soil protection and stabilization (Figure 1). Unless soil is stable, future sustained production of woody species would be doubtful even with moderate deer use. Furthermore, lack of perennial grasses and forbs creates a serious forage deficiency in early spring.

Deer turn from browse to new growth of grasses soon after snowmelt in spring. Early growing grasses, particularly species of *Poa*, begin growth in March or earlier and make up the greater part of the early spring diet for deer. Two or three weeks

later, perennial forbs start growth, and from early May on they replace grass as the chief deer forage. This period of 3 to 6 weeks from first green growth until new growth is plentiful is often extremely critical for deer. Losses of deer are sometimes heavy at this time on overgrazed ranges. New herbaceous growth in early spring is high in moisture content, and, unless it is abundant, deer may have difficulty harvesting enough for survival. This period is particularly critical for pregnant does, and certainly inadequate nutrition at this time considerably influences prenatal development and subsequent survival of fawns. Ranges in good condition with a mixture of perennial grasses and forbs supply a more adequate diet for pregnant does in early spring than do ranges depleted by livestock.

Range that is in depleted to poor condition for livestock use might be adequate and even superior to good condition livestock range for winter survival of deer for a time, but such range is inadequate for high herd productivity.

Intermediate Range For Deer Suffered From Livestock Overgrazing

In spring, deer use intermediate range during late prenatal fawn development and much of the fawning season. Forbs are their chief forage then and, judging from livestock nutrition, a good forage supply presumably is especially important for fawn survival. Overgrazed livestock ranges, usually deficient in the

Table 1. The effect of summer range condition on deer herd productivity factors in Utah.

Productivity factors	Summer range condition	
	Good	Poor
	(Rate per doe)	
Fetal production	1.85	1.19
Ovulation	1.95	1.31
Triplet production*	0.12	0.00
Yearling pregnancy*	1.00	0.00
Yearling twin production*	0.55	0.00

*Based on limited data

better forb species, apparently are inadequate during this critical season. Fawn mortality of about 40 percent of the number dropped occurs at or soon after birth in many Utah deer herds on such ranges (Julander and Robinette, 1950). Apparently the combination of inadequate forage on overgrazed spring range together with poor winter range is responsible for this heavy fawn mortality.

Deer also graze intermediate range in the fall. They then feed largely on browse, which is usually in adequate supply.

On some intermediate range overgrazed by livestock mules-ear dock (*Wyethia mollis*) and arrowleaf balsamroot (*Balsamorhiza sagittata*) are abundant. Deer graze both of these species heavily and obtain a large amount of forage from them for two or three weeks after their growth starts. Whether dock and balsamroot are superior to the herbaceous cover found on range in good condition is questionable. Good condition range usually has a much greater variety of forbs that would seem more desirable for deer forage than only one or two abundant species.

Livestock Grazing Has Reduced Deer Summer Range

High elevation summer range also was drastically depleted by the large numbers of sheep and cattle from 1890 to 1920 and for many years afterwards. Some areas continue to be overstocked but not so excessively as in early days. Herbaceous vegetation was seriously depleted by livestock. The better shrubs were also reduced.

Since deer depend heavily on perennial forbs for summer forage, depletion of forbs means loss in quality of forage even though there is sufficient quantity for survival through the summer season. Summer losses of deer are light even on the poorest summer range in Utah and simi-

lar country. For this reason, the effect of summer range condition on deer herd productivity has been given little attention. Studies in Utah (Julander *et al.*, 1961) show that ovulation rate of does on poor condition summer range was only 67 percent and fetal rate 64 percent of that found for deer on good condition range (Table 1). An ovulation rate of 1.95 and fetal rate of 1.85 which was reported for deer on good summer range, appears to approach maximum productivity. In comparison, the fetal rate for deer from very poor condition range was 1.31, and the average from central Utah was 1.52 (Robinette *et al.*, 1955). Limited data from the Utah studies show that a greater percentage of mature does on good summer range produced triplets; also a greater percentage of yearlings were pregnant and produced more twins than did deer from summer range in poor condition.

These differences in herd productivity were attributed to differences in condition of deer during the breeding season. Relations of animal nutrition and condition during the breeding season to calf and lamb crops have been well documented in the production of livestock.

Ill effects of poor summer range do not end with the breeding season. Does going onto the winter range in poor condition no doubt stand less chance of winter survival and less chance of raising a fawn the following spring than does in good condition.

Deer Place Additional Burden On Overgrazed Livestock Range

Deer, like all other grazing animals, can destroy vegetation if too many graze a given area. Since dense populations of deer in Utah built up on range already depleted by livestock, further destruction of forage caused by deer added to the hazards of soil erosion and flood.

Browse destruction was drastic on midwinter stress areas of over-stocked deer ranges of Utah. Deer destroyed emergency forage as well as the better browse. Tall shrubs and trees such as cliffrose, curleaf mountain mahogany, and juniper were highlined. Sagebrush and other low-growing shrubs were killed or seriously weakened. On such range, deer no longer can build up to the dense populations that once existed. There is no longer an accumulation of past growth and low value plants for emergency forage. On such depleted areas, numbers of deer are limited largely by current annual growth and deer can starve during only average winters. For example, an estimated 40 percent of the Heaston herd in central Utah starved during the moderate winter of 1947-48 (Table 2). Severe winters, which force deer onto winter-stress areas for longer than usual periods, can cause drastic losses on depleted range. Losses in northern Utah deer herds during the severe winter of 1948-49 were estimated to be 50 percent.

Table 2. Relation of winter deer mortality in central Utah to range condition for moderate and severe winters.

Area	Range condition	Mortality	
		Moderate winters	Severe winter (1948-49)
- - - - (Percent) - - - -			
Oak Creek	Fair	8 ¹	9
Meadow Creek	Depleted	—	27
Bellyache	Depleted	14 ²	27
Heaston	Severely depleted	40 ³	42

¹Average for 1946-47 and 1947-48

²Average for 1945-46 and 1946-47

³Estimated for 1947-48

Studies elsewhere in Utah following this severe winter of 1948-49 revealed that a winter loss on range with fair browse conditions was about 9 percent, only slightly higher than the average (8 percent) for the two previous open winters on this area. On deteriorated range nearby, the loss was three times as much (27 percent); and on a severely depleted range more than five times as much (48 percent) as on fair condition ranges (Robinette *et al.*, 1952).

Deer influences on summer and intermediate range are often overlooked. Any deer on a range already overgrazed by livestock adds to the problems of maintaining vegetative cover and soil stability. Large populations of deer grazing on range already overstocked with livestock places a serious burden on the range.

Management practices that permit excessive browsing on aspen reproduction jeopardize the future of many aspen stands in Utah and adjacent states. This condition prevails mainly where populations of big game (principally deer) are large. Only where livestock grazing is very severe do livestock alone prevent aspen regeneration: i.e., where they congregate locally for shade or water or are held too long on an area. General observations indicate that deer prevent aspen regeneration primarily on ranges that have been previously depleted by livestock. Many forbs and some shrubs found on good condition aspen range are more palatable to deer than is aspen (Julander, 1955). When choice forage occurs in sufficient amounts, aspen use is light. Thus, deer are directly responsible for lack of aspen regeneration in many areas, but livestock often may be indirectly responsible.

Management Improves Deer Habitat

Range management practices that have improved deer range conditions in recent years are: (a) a serious attempt to adjust numbers of both livestock and game to the grazing capacity of the range; (b) improved management of livestock and game; (c) reservation of key game wintering areas for exclusive game use; (d) adjustments in season of livestock grazing to favor big game on winter range, and (e) artificial rehabilitation of ranges for both livestock and game.

Factors that need additional attention include: (a) more consideration of wildlife needs in artificial restoration of range for livestock; (b) greater stress on the total effects of both big game and livestock pressures on the range and better integration of their combined use, and (c) sufficient immediate reductions of grazing animals or changes in grazing practices to halt gradual range deterioration on many areas and provide for much needed recuperation.

Summary

Heavy grazing by livestock in early days (1890-1920) caused profound changes in mule deer range in Utah that have reduced herd productivity.

Overgrazing by livestock and reduced wildfire resulted in an increase in woody species on deer winter range. This made possible the buildup of excessive deer numbers—probably far greater than could have been possible on virgin range. However, overgrazed livestock range often does not provide sufficient herbaceous forage for deer during the critical early spring period.

Intermediate range overgrazed by livestock may provide adequate browse for deer use in the

fall, but may be deficient in new forb growth required by does in late pregnancy and during fawning season.

Depleted summer ranges may provide survival rations for overpopulations of deer, but do not provide nutrients sufficient for high herd productivity. Adequate yearlong forage is essential for maximum herd productivity.

Overpopulations of deer on range already overgrazed by livestock have drastically deteriorated both vegetation and soil on deer winter-stress areas, and have added to range problems on intermediate and summer range.

Because deer have destroyed most of their emergency forage on many areas, maximum winter populations are now limited largely by the amount of current growth of forage.

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