

# White-tailed Deer Preferences and Hunter Success under Various Grazing Systems

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**Highlight:** Preferences of white-tailed deer to various grazing management systems now being tested at the Texas A&M University Agricultural Research Station, Sonora, were evaluated on the basis of deer density and economic returns from hunting. Hunter success was evaluated on the basis of several factors. White-tailed deer definitely preferred a rangeland grazed under a system which included a systematic rotational deferment, and the more frequent the deferment the higher the preference. Hunter success was directly related to deer density, time during the season hunted, brush management, and type of grazing system utilized. Results from this study indicates that good livestock grazing management can also be good big-game range management.

Any landowner who has white-tailed deer (*Odocoileus virginianus*) or other game animals knows or should know their economic importance. However, very few landowners whose major source of income comes from livestock think they can afford to actually "manage" for their wildlife. This may stem from the misconception that good wildlife-range management is not good livestock-range management. Even though the requirements for managing certain wildlife species such as game birds may be different than for livestock, range management for the white-tailed deer and most other big game species in Texas is essentially the same as for livestock. However, when large

acres of rangelands are completely cleared and converted "improved" pastures, they could lose much of their value as white-tailed deer habitat.

Many factors such as quality and quantity of game animals, type of commercial lease, prices charged, and number of hunters will affect income from wildlife to landowners. The success of any wildlife management program, which includes the harvest of excess animals on a commercial basis, is measured primarily from two viewpoints, the hunter's and the landowner's. The hunter's viewpoint, of course, includes the chances for harvesting some game animals, i.e. hunter success. The landowner's viewpoint includes obtaining maximum sustained net economic returns. To be a consistently successful wildlife manager requires skill plus knowledge about the requirements, habits, and preferences of wildlife such as white-tailed deer (Brothers and Ray 1975).

Most landowners manage their rangeland primarily for domestic livestock, thus leaving game animals to take what they can, when they can. This may create severe competition for available food between livestock and white-tailed deer. As competition increases, available forage decreases and deer reproductive rates, body size, and antler quality are reduced correspondingly (Teer et al. 1965; Thomas 1966). Since white-tailed deer generally spends most of its life near the place it was born, it seldom has a choice as to the type or condition of the rangeland it occupies. However, if white-tailed deer had a choice, they definitely would prefer certain rangeland management systems over others (Merrill et al. 1957; Pascoe and Hicks 1970).

Since the landowner's primary objective is to obtain maximum sustained income, he must develop management programs

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**Table 1. Income from hunting program on Sonora Research Station, 1971-75.**

	1971	1972	1973	1974	1975	Average
Number of hunters	59	97	80	60	60	71
Days of hunting offered	8	8	6	6	6	7
Deer harvested	45	54	44	30	40	43
Hunting fee per day (\$)	26.00	28.00	35.00	35.00	40.00	32.80
Net income per deer harvested*	51.00	81.07	105.34	115.50	98.78	90.34
Net income per acre	.66	1.26	1.34	1.00	1.14	1.08

\* Expense items used in figuring net income are "out-of-pocket" expenditures only.

to improve both the livestock and wildlife habitats. This is not always an easy task since there is such a wide variation in rainfall patterns, hunter preferences, landowner preferences, present habitat and deer herd conditions, location of ranch, and many other factors. Present research comparing various grazing management systems at the Texas A&M University Agricultural Research Station at Sonora, Tex., offers an excellent opportunity to study some of these factors. Objectives of this research were to identify or determine: (1) preferences of white-tailed deer to different grazing management systems; (2) factors affecting hunter success (hunter success in this paper is defined as the percent of hunters harvesting at least one deer during a 2-day hunt).

### Study Area and Methods

This study was conducted on the Texas A&M University Agricultural Research Station at Sonora, Tex. The station is located in the Edwards Plateau or Hill Country region of Texas, midway between Rocksprings and Sonora on State Highway 55. The Sonora Station is operated under various research projects designed to gain information concerning both livestock and wildlife habitat improvement.

Seven grazing management systems are being compared under current projects. They include four separate Merrill grazing systems under various brush management methods, a 7-pasture short duration system, and continuous year-long grazing at two stocking rates.

The Merrill grazing system includes three herds of livestock on four pastures with each pasture being grazed 12 months, then rested 4 months. One Merrill system has been root-plowed and seeded to native grasses, one has been aerial sprayed, and one has had the brush thinned or grubbed out with a bulldozer. The other Merrill system has had no brush control. The 7-pasture system has had no brush control and has 7 pastures and one herd of livestock which is moved to a new pasture every 3 weeks. Therefore, each pasture is grazed 3 weeks then rested 18 weeks. The two continuously grazed pastures are never rested and have received no brush treatment. All systems are grazed with cattle, sheep, and goats at a ratio of 60-20-20, and stocking rates were maintained as listed in Table 2. All pastures are approximately 80 acres in size and are separated by low fences, which permit deer to move freely between pastures and choose the grazing management system or habitat they prefer.

**Table 2. Livestock stocking rates, deer densities, and hunting revenues from seven systems of grazing at Sonora Research Station, 1971-75.**

Grazing system	Livestock stocking rate (acres/AU)	Deer* density (acres/deer)	Hunting* revenues (income/acre)
Moderate-continuous	16.0	18 c	\$ .82 b
Heavy-continuous	11.9	20 c	.59 b
Merrill:control	16.0	15 b	2.25 a
Merrill:aerial-sprayed	12.8	16 b	.88 b
Merrill:front-end grubbed	12.8	16 b	.62 b
Merrill:rootplowed	12.8	15 b	.79 b
7-pasture short duration	10.7	10 a	1.79 a

\* Numbers in a column not followed by the same letter differ significantly at the 5% level.

Other than brush treatment, there are very few basic differences between pastures. They are all included in one major range site. There are some vegetative differences which are a result of the grazing system.

White-tailed deer preferences for the various grazing management systems were evaluated by two basic methods: (1) making periodic nighttime and early morning census counts in each pasture to determine deer densities; (2) setting up an actual commercial day-hunting enterprise to estimate income to each grazing system. Significant differences were determined by analysis of various procedures.

All harvested deer were recorded according to the pasture where they were taken. Carcass data such as weight, age, sex, body, and antler characteristics were also recorded. Estimated hunting income to each grazing system was determined annually from the average value of each harvested deer times the actual number of deer harvested in that system. Average value of each harvested deer was based on total hunting income divided by the number of deer harvested. Net income figures are based on the gross income minus only "out-of-pocket" expenditures. "Out-of-pocket" expenditures included expenses such as annual depreciation of deer blinds, truck mileage, labor costs, and all maintenance expenses. An effort was made to distribute hunters on all pastures to equalize hunting pressure and chances of harvesting a deer. General information about the hunting program on the Sonora Station, the number of hunters, number of deer harvested, and income per deer and per acre is given in Table 1. Hunting occurred only on weekends and all hunters were allowed to take their legal limit of deer (three deer) if possible.

Conclusions concerning hunter success were drawn by running regression analyses and correlating data such as annual rainfall, deer density, fawn crop, time hunted, and grazing system to the number of deer harvested.

### Results and Discussion

#### Preference of White-tailed Deer for Various Grazing Systems

When deer were given a choice, they preferred grazing management systems that Merrill et al. (1975) had reported to be best for livestock (Table 2). The highest deer density was found in the 7-pasture system (Table 2). This was not surprising since these pastures are grazed by domestic livestock only 6 to 9 weeks per year and also receive the most frequent rest. It should also be noted that the 7-pasture system maintained this high deer density even though it also supported the highest concentration of livestock. Deer densities were not significantly different among the four Merrill systems, although both continuously grazed pastures had significantly lower deer populations. This supports the idea that deer do prefer to stay in pastures which are periodically deferred and indicates that the more frequent the deferment the higher the preference for this system.

Maximum income per acre, which was highest in 1973, was a function of the number of hunters and the price they were charged and not necessarily hunter success or number of deer harvested (Table 1). In 1974 the number of hunters was less than in 1973. This reduction was necessary since deer census counts made prior to the 1974 hunting season indicated that the overall

deer population was down. Therefore, it was necessary to reduce the numbers of hunters to obtain a desirable deer harvest.

The highest economic returns, which were a result of number of deer harvested or hunter success, came from the Merrill and 7-pasture system which have had no brush treatment (Table 2). There was no significant difference among the other treatments.

At first glance, the low incomes from the Merrill systems which were either sprayed, grubbed, or rootplowed seem to indicate that brush control was detrimental to the deer habitat. However, the deer populations in these pastures remained relatively high (Table 2). This indicates that brush treatment lowered hunter success but not necessarily deer densities. Observations have shown that deer utilize cleared areas during darkness and uncleared pastures during daylight. This emphasizes the importance of careful planning in any brush clearing operation. Leaving strips or motts of brush will not only provide the cover and food necessary for wildlife, but will also make the area more huntable, and improve hunter success.

#### Factors Affecting Hunter Success

The major factor contributing to hunter success in this study was deer density. There was a positive correlation between deer density and hunter success. Alternating high then low deer densities on the whole ranch were evident from 1971 through 1975, but were not statistically correlated to previous or present year's rainfall since rainfall was above average (average is approximately 23 inches) in all years. Previous or present year's fawn crop was also not correlated to hunter success.

Another factor affecting hunter success in this study was the time the person hunted during the hunting season (Table 3). Hunter success was always highest on the first two weekends. This is probably because in central Texas the white-tailed deer's breeding activities (when male deer are most easily killed) usually begin during October or November and then slow down by the third weekend of hunting season. Also, by the third weekend most deer have become very wary of hunting activities.

Since deer tended to prefer certain grazing systems over others and since high deer density was related to hunter success, it can be concluded that landowners who are interested in improving their rangelands while increasing big game and livestock revenues can set up grazing management systems which accomplish both objectives. The type of system employed will be determined by such criteria as present ranch facilities, range conditions, climate, and type of livestock management utilized. By setting up a system with a rest period

**Table 3. Hunter success by weekend from 1971-75 on the Sonora Research Station.**

Year	Hunter success (%) by weekend*		
	1st weekend	2nd weekend	3rd weekend
1971	63	50	44
1972	52	58	18
1973	48	52	32
1974	46	23	15
1975	48	61	31
Average	51	52	26

\* Hunter success is defined as the percent of hunters harvesting at least one deer during a 2-day hunt.

long enough to improve range conditions and frequent enough to maintain high deer densities a landowner can expect to increase both hunter success and total income.

#### Conclusions

Results from this study show that good livestock-range management can be good big-game range management. High hunter success was attributed to high deer density and deer density was attributed to the type of grazing system utilized. Highest deer densities and economic returns came from grazing systems which included a systematic deferment and the more frequent the deferment, the higher the deer preference for that system. Care should be taken in planning and carrying out any rangeland brush management. Clearing out extremely large areas may reduce hunter success even though it may not reduce deer density. Thus, with careful planning, rangeland resources can be managed to increase returns from both livestock and big game animals.

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