

# White-tailed Deer Competition with Goats, Sheep, Cattle and Exotic Wildlife

---

---

*W. E. Armstrong  
Texas Parks and Wildlife Department  
Hunt, Texas*

Deer management is a relatively simple process. If you can grow deer foods, you can grow deer. By understanding deer food habits in relation to livestock food habits, the land manager can manipulate both livestock and deer numbers to grow more deer foods.

## Kinds of Forages

Today's rangelands are capable of producing a given quantity of forage. This forage can broadly be divided into three groups—forbs, browse and grass.

Forbs are best defined as broadleaved flowering plants which most people call weeds. Although many are perennials or biennials, most are annuals. Forbs are generally seasonal with the greatest abundance being in the spring, depending on local rainfall patterns. As a group, they are high in protein. Examples of forbs are velvet bundleflower, mat euphorbia, Dakota verbena and knotweed leafflower.

Browse plants are shrubby or woody plants. They are deeper rooted, more drought-resistant plants than most forbs or grasses. As a group, they are lower in protein than forbs. Examples of browse plants would be hackberry, live oak, Texas oak and guayacan.

Grasses are those plants with long narrow leaves, jointed stems, flowers in spikelets and a seedlike fruit. Most of the major grasses are perennial and lower in protein than forbs. Examples of grasses would be little bluestem, Indiangrass, Texas wintergrass, johnsongrass and fescuegrass.

## Food Habits of White-Tailed Deer and Domestic Livestock

Many food habit studies of white-tailed deer have been conducted throughout the state of Texas. Several of these studies were concerned not only with the food habits of white-tailed deer, but also with the competitive effects of domestic livestock on white-tailed deer food habits.

In the 1960s, the Kerr Wildlife Management Area conducted a series of studies to determine the food habits of white-tailed deer, domestic sheep, Angora goats and cattle under three different grazing conditions. In this study, a tame deer, sheep, goat and cow were taken to a 96-acre enclosure that had not been grazed by domestic livestock or deer for a period of 6 years prior to the study.

Bites of plants that these animals consumed were recorded by species at weekly intervals over a year's period of time. The same animals were then taken to a pasture that was heavily grazed by cattle, sheep and goats at a rate of one AU per 8 acres. This pasture also contained white-tailed deer. The experimental animals' food habits were recorded in this pasture. The third pasture to which the animals were taken contained only white-tailed deer. Deer numbers in this pasture were at saturation level. Bites of food by these animals were also recorded in this pasture. The results of these bite studies were then totaled. Comparisons were made between the heavily grazed pasture, the deer-only pasture and the enclosure. In the enclosure, when given a free choice of what it wanted to eat, the white-tailed deer preferred forbs when they were available. As forbs became unavailable in the summer and fall, the white-tailed deer began to shift its diet to browse. Grass never accounted for more than 15 percent of the deer's diet, even in the heavily grazed pasture where forbs and browse were in short supply and competition for food was severe.

Just as deer were primarily forb eaters, so were sheep. But as forbs began to disappear in the summer and fall, the sheep began to eat both grass and browse. In the heavily grazed pasture, grass accounted for the major portion of the sheep's diet.

Goats were primarily browsers, taking some forbs when available. In the enclosure, when given a free choice of plant species, goats did not consume a large quantity of grass. In the heavily grazed pasture, goats did consume a larger quantity of grass than deer but were still primarily browse eaters.

Cattle in the ungrazed enclosure preferred grass, taking some forbs and browse. During the winter, cattle on the Kerr Area took a surprisingly large amount (73 percent) of liveoak, which is an evergreen. In the heavily grazed pasture, cattle were primarily grass eaters.

Analysis of the bite study data suggests that cows, sheep and goats can survive on three classes of forage, whereas the white-tailed deer readily utilizes only two classes of forage (forbs and browse). This is not to say that deer do not eat grass. Bite studies on the Texas Agricultural Experiment Station at Sonora indicate that deer will utilize as much as 20 percent grass in their

diets on those occasions when grass is in a "lush" or rapid state of growth. On the Experiment Station, this was primarily johnsongrass and cane bluestem, following 11 inches of rain in July. However, grasses only accounted for 8 percent of the deer's total yearly diet. As grasses matured and became more coarse, deer began to avoid them.

## Deer Digestion

Studies of deer digestion by Short indicate that deer do not digest coarse fibered plants as readily as low fibered plants. In addition, it has also been determined that browse plants high in oil content inhibit the "fermentation" process in deer. Domestic livestock are more efficient in digestion of these plants. It is not unusual to find deer which have "starved" with a paunch full of grass.

## Effects of Competition for Food on White-tailed Deer

Evidence of the effects of competition by domestic livestock on white-tailed deer were also studied on the Agricultural Experimental Ranch at Sonora. Deer populations were monitored on pastures that were continuously stocked at heavy, moderate and light grazing rates. Deer numbers were greatest in the lightly stocked pastures as opposed to the heavily stocked pastures. In pastures stocked with goats, sheep or cattle, the fewest deer were found in the heavily grazed sheep pasture (one deer to 40 acres) as well as the goat pasture (also one deer to 40 acres). Light grazing with sheep only produced one deer per 20 acres. Light grazing with goats produced one deer per 32 acres. One deer per 15 acres and one deer per 7.3 acres were recorded in the heavily and lightly stocked cattle only pastures, respectively.

The deer were avoiding those areas in which domestic livestock were depleting browse and forb populations. Classes of livestock coupled with stocking rates influence forb and browse production. This in turn influences deer carrying capacity.

## Food Habits of Exotics

Food habit studies have also been conducted with axis, silo and fallow deer, as well as with blackbuck antelope and aoudad sheep. These were conducted on the Kerr Area and the results are in the process of being published. The study utilized the animal bite method. Food habits were studied in three different pastures under three different grazing conditions. Grazing conditions were:

1. a non-grazed pasture in which no livestock or deer had been grazed for a minimum of 15 years prior to the study,
2. a pasture containing white-tailed deer only (at carrying capacity), and

3. a pasture that was being grazed by domestic livestock at a rate of one AU per 16 acres.

Results of these studies indicate that these major exotics can effectively utilize three classes of forage. As far as food habits are concerned, they are either "sheep" or "goats" in deer clothing. That is, they prefer forbs or browse but are able to shift their diets to grass without apparent signs of malnutrition.

## Effects of Exotic Competition

As an extension of this study, six sika deer and six white-tailed deer were placed in a 96-acre pasture. No hunting or predation occurred in the pasture. Sika deer and white-tailed deer increased to 27 and 18, respectively, on 96 acres before competition for food became severe. White-tailed deer at this time decreased to six animals. Sika deer increased to 32 during the same period. By the ninth year of study, there were 59 sika deer and no white-tailed deer alive in the pasture.

A similar study was carried out with axis deer and white-tailed deer with similar results. Populations of axis and white-tailed deer reached peaks of 16 axis and 15 white-tailed deer before competition for forbs and browse became severe. White-tailed deer populations decreased to three animals at the end of the study while axis populations were at 16 animals in 96 acres.

In both cases, exotics and white-tailed deer depleted a food supply causing losses in white-tailed deer. Exotics shifted their diets to grass, survived and reproduced. By maintaining grazing pressure on white-tailed deer foods, exotics depleted white-tailed deer foods from the pasture. Loss of foods resulted in losses of white-tailed deer.

## Conclusions

Conclusions drawn from the studies conducted on food habits of white-tailed deer, domestic livestock and the major exotics found in Texas suggest that white-tailed deer are able to utilize a more narrow range of plants (plants low in cellulose fiber or low in oils) than either domestic livestock or exotics.

Sheep are competitive with white-tailed deer primarily for the higher protein forbs, while goats compete with deer for the more stable drought-resistant browse. Cattle on properly stocked ranges are the least competitive with white-tailed deer. No conclusions were drawn on the effects exotics have on domestic livestock although it seems obvious that many exotics would be highly competitive with domestic livestock, especially goats.

Our ranges only produce a given quantity of forbs and browse. If a given range will produce enough

forbs or browse to produce 100 animals and if 90 of them are goats and 10 are white-tailed deer, then the 10 white-tailed deer will have adequate diets and grow into healthy animals. If 90 are white-tailed deer and 10 are goats, then all will be healthy animals.

The problem comes when we overstock our ranges with domestic livestock as well as white-tailed deer. White-tailed deer, which are not as competitive as the domestic livestock, will suffer from malnutrition. The

result will be small, stunted deer with poor antler development, low fawn production and frequent die-offs.

In conclusion, our ranges are capable of producing a given quantity of forage comprised principally of forbs, browse and grasses in varying amounts. This forage will support a given number of animals. By analyzing the competition for forages available and adjusting both domestic livestock, exotic and native deer numbers to this forage, we can produce healthy, good quality, high producing animals.

## Appendix I

The following is a list of some of the more preferred food items in the white-tailed deer diet. Since browse plants are the more stable range plant in the deer's diet (not as weather related as forbs), browse plants are good indicators of deer range. Adequate forb production should release grazing pressure on browse. Heavy dependence on browse in the spring and early summer indicates an overpopulation of forb or browsing animals. This, in turn, inhibits good deer production.

### Selected South Texas forage plants:

Pricklypear cactus	<i>Opuntia lindheimeri</i>
Mesquite mast	<i>Prosopis glandulosa</i>
La coma	<i>Bumelia celastrina</i>
Granjeno	<i>Celtis pallida</i>
Catclaw acacia	<i>Acacia greggii</i>
Desert lantana	<i>Lantana macropoda</i> var. <i>albiflora</i>
Lime pricklyash	<i>Zanthoxylum fagara</i>
Guayacan	<i>Poeligeria angustifolia</i>
Allthorn castela	<i>Castela texana</i>
Texas silverleaf	<i>Leucophyllum frutescens</i>
Texas colubrina	<i>Colubrina texensis</i>
Perennial lazy daisy	<i>Aphanostephus riddellii</i>
Kidder dosedaisy	<i>A. kidderi</i>
Dayflower sp.	<i>Commelina</i> sp.
Prostrate euphorbia	<i>Euphorbia prostrata</i>

### Selected Rolling Plains forage plants:

Mistletoe	<i>Phoradendron serotinum</i> var. <i>pubescens</i>
Indianmallow	<i>Abutilon incanum</i>
Pricklypear	<i>Opuntia lindheimeri</i>
Woollybucket bumelia	<i>Rhus aromatica</i>
Common mesquite (mast)	<i>Prosopis glandulosa</i>
Spreading sida	<i>Sida filicaulis</i>
Gray goldaster	<i>Heterotheca canescens</i>

## Appendix I (continued)

### Selected East Texas forage plants:

Alabama supplejack	<i>Berchemia</i> sp.
White ash	<i>Fraxinus americana</i>
Yaupon	<i>Ilex vomitoria</i>
Blackberry	<i>Rubus</i> sp.
Greenbriar	<i>Smilax</i> sp.
Kentucky virburnum	<i>Virburnum molle</i>
Georgia holley	<i>Ilex longipes</i>
Honey locust	<i>Gleditsia</i> sp.

### Selected Edwards Plateau forage plants:

Texas oak (Spanish oak)	<i>Quercus texana</i>
Liveoak	<i>Q. virginiana</i>
Post oak	<i>Q. stellata</i>
White shin oak	<i>Q. breviloba</i>
Woollybucket bumella	<i>Bumelia lanuginosa</i>
Hackberry	<i>Celtis</i> sp.
Greenbriar	<i>Smilax</i> sp.
Elm	<i>Ulmus</i> sp.
Flameleaf sumac	<i>Rhus copallina</i>
Grape sp.	<i>Vitis</i> sp.
Velvet bundleflower	<i>Desmanthus velutinus</i>
Knotweed leafflower	<i>Phyllanthus polygonoides</i>
Prickly lettuce	<i>Lactuca serriola</i>
Southwest bedstraw	<i>Galium</i> sp.
Mat euphorbia	<i>Euphorbia serpens</i>
Four-o'clock sp.	<i>Mirabilis</i> sp.