



White-tailed Deer Browse Preferences for South Texas and the Edwards Plateau

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It is common knowledge that deer need food, water, shelter and space for survival. When a casual observer sees the countryside with abundant trees and plants it may appear that deer have plenty to eat. But that is not necessarily the case. Some plants are not edible, some are not palatable, and some are available only at certain times of the year.

White-tailed deer use three major plant groups as food (Fig. 1)—forbs (broadleaf herbaceous plants), browse (leaves and tender twigs of woody plants) and grasses. Deer prefer forbs, but these plants are normally available only in certain seasons and if rains do not come at the right time they may not be available at all. Contrary to popular belief, deer consume only small quantities of grass and usually only when it is young and tender. Because both deciduous and evergreen woody plants are readily

available, browse tends to be the most stable food source for white-tailed deer in South Texas and the Edwards Plateau. Among browse plants on the range, deer have definite preferences. The land manager who understands those preferences and the seasonal browse habits of deer can judge the success of management practices aimed at improving rangeland for the production of high-quality white-tailed deer.

The Nutritional Status of Deer

The nutritional status of deer is determined by the palatability, availability and quality of the food supply. Palatability is the combination of characteristics (tenderness, taste, smell, etc.) that influence an animal to eat a food. Palatability has the most to do with an



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White-tailed Deer

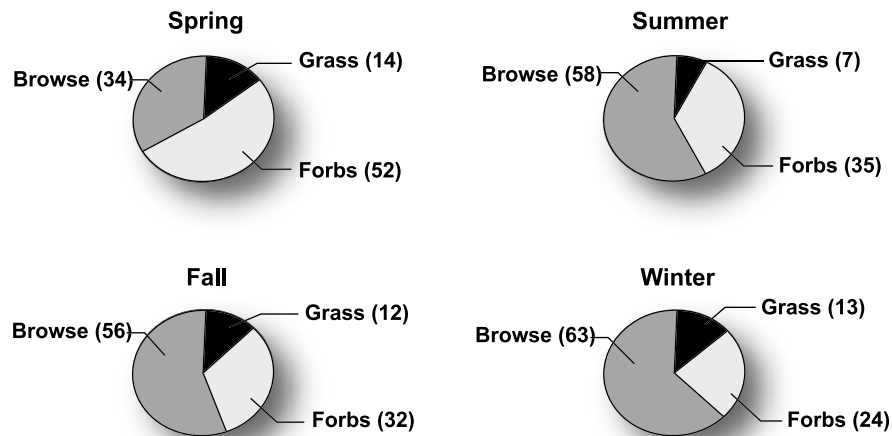


Figure 1. Seasonal white-tailed deer diets in Texas by plant group (percent).

animal's preference for certain food items until the availability of those foods decreases. At that point, a deer's diet is determined more by what food is available. The availability of food is, of course, dependent upon the current year's production of forage (as influenced by rainfall) and the intensity of browsing by herbivores.

Food quality, the third factor, is typically expressed as crude protein and digestibility. These measures reflect the nutritional value of a food. Some people believe that deer and other animals have a natural instinct for identifying and consuming the forage plants that are the most beneficial from a dietary standpoint. This controversial concept is known as "nutritional wisdom." It implies that an animal knows what it needs to eat in order to maintain a high level of nutrition. There is no scientific proof to support this contention.

Browse Species Preference Groups

Biologists do not always agree on the browse plants white-tailed deer prefer or the plants' nutritional value. Biologists know that preference for a particular plant or group of plants is influenced by factors such as soil type, growth stage of the plant, degree of use by herbivores, and the availability of other plants. Consequently, the categories of preference in this publication may be different than those in other sources.

Plant preference is a relative issue, not an absolute. Certain browse plants will always be favored by deer, regardless of the circumstances. However, in a degraded habitat deer usually will eat less favored plants as though they were highly preferred. In other words, a plant can become the favorite by default if nothing better is available. Nevertheless, managers who carefully observe deer browse habits will know better how to manage the woody species in an area and make decisions about deer harvest that balance animal numbers with forage supplies.

In Tables 1 and 2, plants are divided into four degrees of preference — High, Moderate, Low and Least Used. These categories are based upon preference for the leaves and stems of the plants, not the mast (fruit, berries, nuts or beans). Many browse plants produce mast deer eat readily. For example, mesquite beans can be a very common food item during the summer months in South Texas. However, identifying the degree to which deer use mast does not help determine the appropriate level of use of woody species for range management purposes. In fact, it is arguable that mast is a bonus and not a necessity from a foraging standpoint. If deer populations are heavily dependent upon mast, it may be that the habitat needs more management.

Plants in the **High** preference group are usually in short supply and may even be absent from ranches because of heavy browsing by livestock and/or deer in the

Table 1. White-tailed deer preference for woody plants, vines and cactus of the Edwards Plateau.

High	Moderate	Low	Least Used
Carolina buckthorn	Bumelia	Black brush	Agarito
Hawthorn	Blackcherry	Catclaw acacia	Baccharis
Inland ceanothus	Blackhaw	Common buttonwood	Catclaw mimosa
Kidneywood	Blackjack oak	Evergreen sumac	Juniper (cedar)
Little leaf leadtree	Bluewood (Brasil)	Feather dalea	Cenizo
Mistletoe	Carolina snailseed	Flameleaf sumac	Guajillo
Mountain mahogany	Chingapin oak	Fragrant mimosa	Honey mesquite
Plum	Clematis	Hogplum	Javelinabush
Rusty blackhaw	Elbowbush	Live oak	Little walnut
Shrubby boneset	Elm	Littleleaf sumac	Lotebush
Texas madrone	Ephedra	Peachbrush	Mexican buckeye
Texas mulberry	Fourwing saltbush	Pecan	Mountain laurel
Texas oak	Grape	Roughleaf dogwood	Pricklyash
Texas sophora	Greenbriar	Silktassle	Prickly pear
White honeysuckle	Hackberry	Skunkbush sumac	Texas persimmon
Wild plum	Ivy treebine	Vasey shin oak	Whitebrush
	Lacey oak	White shin oak	Yucca
	Netleaf forestiera		
	Poison ivy		
	Possumhaw		
	Post oak		
	Redbud		
	Roemer acacia		
	Virginia creeper		
	Western soapberry		

Table 2. White-tailed deer preference for woody plants, vines and cactus of South Texas.

High	Moderate	Low	Least Used
Chomonque	Bluewood (Brasil)	Blackbrush	Agarito
Elbowbush	Catclaw acacia	Cenizo	Allthorn
Ephedra	Guayacan	Desert yaupon	Amargosa
Fourwing saltbush	Guajillo	Hogplum	Coyotillo
Kidneywood	Lime pricklyash (Colima)	Huisache	Creosote bush
	Prickly pear	Lantana	Honey mesquite
	Spiny bumelia (Coma)	Lotebush	Knifeleaf condalia
	Spiny hackberry (Granjeno)	Palo verde	Mountain laurel
	Sugar hackberry	Retama	Screwbean mesquite
	Texas ebony	Shrubby blue sage	Whitebrush
		Texas persimmon	Wolfberry
		Twisted acacia (huisachillo)	





past. These plants can show a hedging effect (stems have a stiff, thick appearance containing rounded or blunt ends) regardless of deer numbers. So moderate hedging of the plants in this group is not necessarily an indicator of excessive browsing. However, severe hedging or the disappearance of these plants from an area is evidence of overuse. If young seedlings reappear later, it is evidence that these plants could be recovering and a sign that the quality of the habitat is improving.

Plants in the **Moderate** preference group are not as attractive to deer as plants in the High preference group, but deer eat them readily. If plants in this group are browsed heavily in early summer, there are probably too many browsing animals. As a rule of thumb, plants in this group should not be browsed more than 50 percent by the end of summer. Slight to moderate hedging is acceptable for these plants.

The **Low** preference group is used by deer after more desirable plants disappear from the range. In the Edwards Plateau, live oak is in this group. It is a large part of deer diets because it has green foliage all year. However, moderate to heavy browsing of live oak in the summer is not a good sign. When there is adequate browse in the habitat, live oak is browsed mostly in the winter and less than 50 percent of the current year's growth should be used.

The **Least Used** group includes a number of woody plants that are often considered invasive and undesirable and are managed

to control their abundance. These plants become abundant because they are rarely browsed and thus gain a competitive advantage over the plants animals prefer to eat. Least Used plants usually are protected from browsing by physical or chemical deterrents. For example, cedar has volatile oils (terpenes) that discourage browsing. Agarito has a physical defense; young leaves are tender and readily eaten, but mature agarito leaves are tough with sharp spines on the edges and are rarely eaten. Although mesquite has formidable thorns, its main protection from browsing appears to be leaf chemicals.

Evaluating the Quality of Deer Diets

Protein is vital to the health and survival of deer. It is used in the growth, maintenance and repair of body tissue and is necessary for reproduction, lactation and antler development. Protein requirements for deer range from 7 percent for adults (to maintain proper rumen function) up to 20 percent for weaned fawns (necessary for adequate growth). For a buck to realize its full antler growth it must have proper nutrition and a diet of 16 percent protein is believed to be optimal for antler production.

Crude protein levels are commonly used in evaluating forage quality (Tables 3 and 4). Crude protein is not a flawless index

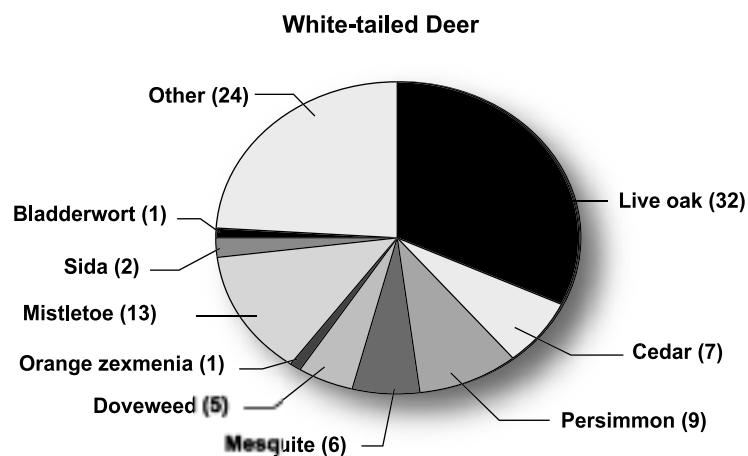


Figure 2. Annual white-tailed deer diet across four locations in the Texas Hill Country. Heavy consumption of plants in the Low and Least Used preference categories suggests an overpopulation of browsing animals and a deterioration of the habitat. (adapted from NRCS data).

Table 3. Seasonal crude protein and digestibility levels in some Edwards Plateau browse and cactus.*

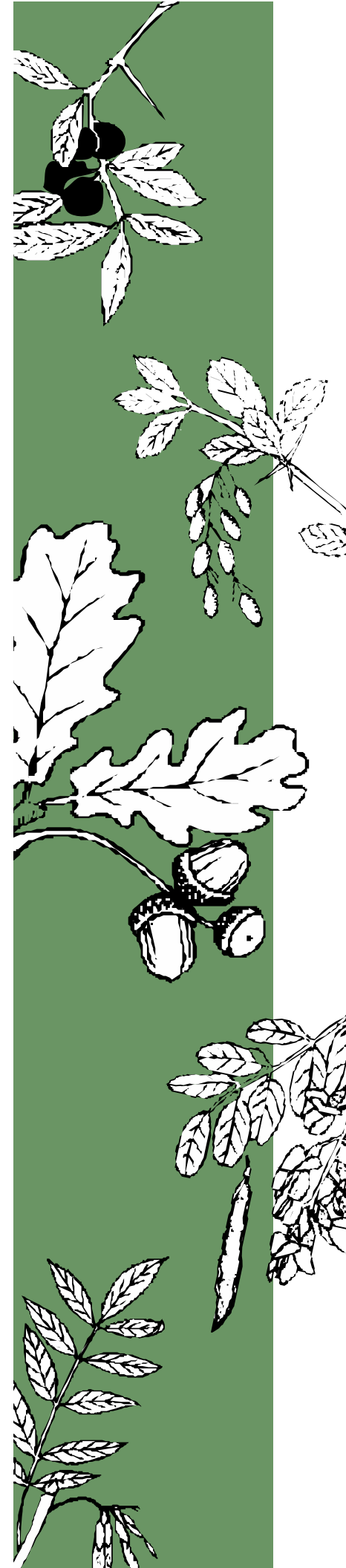
Species	Spring		Summer		Fall		Winter	
	CP	DMD	CP	DMD	CP	DMD	CP	DMD
Agarito	13-16	85-89	14		10-16	87	-	
Ashe juniper	5-6	60-68	5-7	59-65	7-10	62-66	5-7	65-67
Catclaw acacia	21-30	47-61	16-23	41-50	13-19	34-53	13-17	35-47
Hackberry	-		8-20		-		-	
Hogplum	18-24	56-59	15-25	49-72	13-22	49-54	17	50
Kidneywood	24-26	53-62	20-22	46-57	11-23	50-53	17-20	45-54
Live oak	10-20	57	9-10	49	8-12	51	9-10	48
Lotebush	18-24	38-59	15-19	34-52	16-20	32-44	12-15	30-39
Honey mesquite	26-32	58-68	16-24	65-66	9-12		16	
Mountain laurel	-		17-18	53-57	-		-	
Prickly pear	2-13	68-76	6-7	67-76	7-10	67-80	2-6	63-78
Redberry juniper	7	66	6-7	58-64	7-9	57-63	7-8	60-66
Texas persimmon	14-25	58	10-14	51	9-12	58	10	41
Whitebrush	23	58	19	51	14-22	55		

* CP — Crude Protein, DMD — Dry Matter Digestibility

Table 4. Seasonal crude protein and digestibility levels in some South Texas browse and cactus.*

Species	Spring		Summer		Fall		Winter	
	CP	DMD	CP	DMD	CP	DMD	CP	DMD
Agarito	13-16	85-89	14		10-16	87	-	
Blackbrush	15-20	22-34	15-18	21-29	15-20	26-37	14-17	26-28
Bluewood	13-24	52-60	14-17	39-48	17-18	35-55	16-18	42-50
Catclaw acacia	21-30	47-61	16-23	41-50	13-19	34-53	13-17	35-47
Cenizo	15-16	57-63	12-13	50-55	11-15	49-55	12-13	50-51
Fourwing saltbush	15-24		8-15		8-19		12	
Guajillo	20-28	38-48	16-21	27-40	17-22	31-47	17-21	29-43
Guayacan	18-26	45-58	17-23	41-57	17-19	43-58	15-17	46-55
Hogplum	18-24	56-59	15-25	49-72	13-22	49-54	17	50
Huisache	23		27	59-67				
Kidneywood	24-26	53-62	20-22	46-57	11-23	50-53	17-20	45-54
Lime pricklyash	17-21	52-67	16	58-75	17-19	48-71	15-17	62-70
Live oak	10-20	57	9-10	49	8-12	51	9-10	48
Lotebush	18-24	38-59	15-19	34-52	16-20	32-44	12-15	30-39
Honey mesquite	26-32	58-68	16-24	65-66	9-12		16	
Mountain laurel	-		17-18	53-57	-		-	
Palo verde	24							
Prickly pear	2-13	68-76	6-7	67-76	7-10	67-80	2-6	63-78
Ratama	20							
Shrubby blue sage	13-18	52	14	48	14	48	11	48
Spiny bumelia	14-20	49-51	13-16	36-50	13-15	32-48	12-16	38-48
Spiny hackberry	19-28	64-72	21-31	67-89	20-25	56-69	15-19	63-67
Texas ebony	23	57	20	48	23	45	21	46
Texas persimmon	14-25	58	10-14	51	9-12	58	10	41
Twisted acacia	17-22	28-39	18-20	27-37	20-22	29-33	16-17	28-29
Whitebrush	23	58	19	51	14-22	55		

* CP — Crude Protein, DMD — Dry Matter Digestibility





of nutritional quality because two assumptions are made in the estimate. First, it is assumed that all the nitrogen extracted in the laboratory analysis of the plant comes from a protein source. Second, it is assumed that all amino acids (protein building blocks or basic units) are 16 percent nitrogen by weight. Therefore, the nitrogen extracted in a crude protein analysis is multiplied by a factor of 6.25 ($(1 \div 16) \times 100 = 6.25$) to calculate the crude protein content. In reality, neither of these assumptions is true for all browse species. Many browse plants contain nonprotein, nitrogen-based defense chemicals, which are erroneously included in the calculations of crude protein. For example, guajillo may test at 16 to 20 percent crude protein but have only 2 to 9 percent digestible protein; the rest of the nitrogen comes from alkaloids and other nonprotein chemicals. Therefore, it is important to remember that while crude protein is the most widely used measure of a plant's protein level, it is not always an accurate measure of the protein available to the browsing animal.

Plants in the Least Used group are not necessarily lower in forage quality than plants in the high preference group. For example, crude protein values for mesquite in the spring are comparable to those for a high preference plant such as kidneywood (Table 3). However, the secondary chemicals in mesquite discourage its use.

Protein content is not the only factor that determines the quality of forage. Digestibility also is important (Tables 3 and 4). When a particular plant is said to be 50 percent digestible, only half of the plant matter is usable by the herbivore. A deer would have to consume 3 pounds of that plant to obtain 1.5 pounds of useful forage. This point is an important issue for deer, which must feed quickly to fill their rumens and then retreat to the safety of cover to ruminate and digest those plants. Adult deer are believed to

need forages with at least 50 to 55 percent digestibility, with the needs of lactating does possibly increasing to 65 percent.

Management Recommendations

- Understand the variables that influence foraging. These include weather, soil type, presence or absence of chemical and physical plant defenses, availability of various plants, plant growth stage, and palatability.
- Become familiar with the browse plants on your property and their relative abundance.
- Monitor deer and livestock use of the different categories of browse on your property.
- Manage for herbivore densities that prevent severe hedging or the disappearance of highly preferred browse species.
- Manage for herbivore densities that result in no more than 50 percent use of moderately preferred browse species by the end of summer.
- Manage for herbivore densities that result in less than 50 percent use of low-preference deciduous species by late fall and less than 50 percent use of live oak and evergreens by the end of winter.
- Maintain herbivores at a density that prevents a browse line from developing. (A browse line is the total removal of leaves and stems on trees up to the maximum reach of deer and livestock.)
- When necessary, use mechanical, chemical and controlled burning methods to stimulate growth of desirable browse plants and control invasive brush.
- Manage your habitat in a way that maximizes plant diversity and prevents deer from relying on a narrow food base.

Suggested Readings

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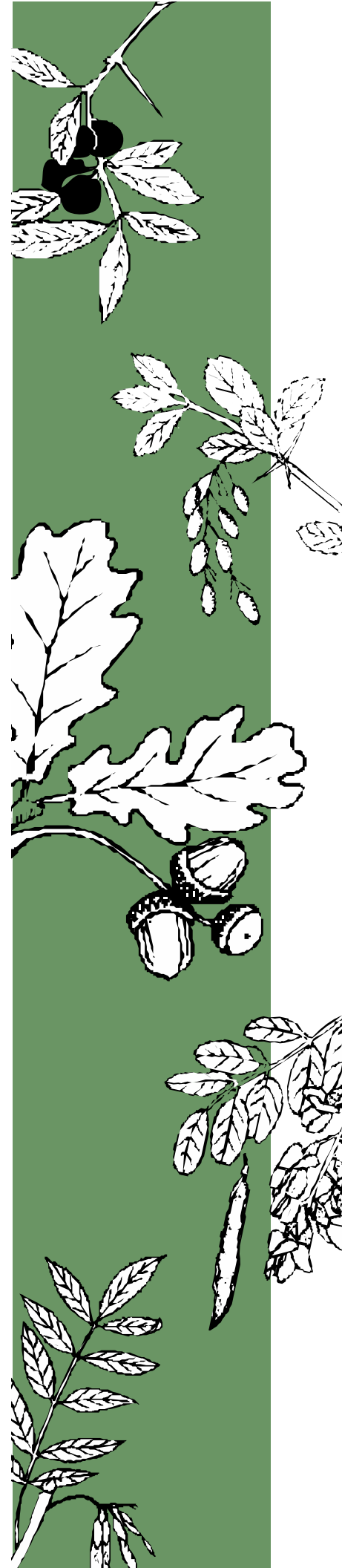
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