

Habitat Selection and Vegetational Characteristics of Antelope Fawn Bedsites in West Texas

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Abstract

Vegetative composition, dominance, and height of cover characteristics were measured at 60 daytime bedsites of pronghorn antelope (*Antilocapra americana*) fawns in a desert grassland in southwest Texas. Fawns were fitted with radio transmitters and were located daily between 8 May and 9 July 1978. Igneous hill and mountain range sites were used 69% of the time during the first 4 weeks of age. Black grama (*Bouteloua eriopoda*), sideoats grama (*B. curtipendula*), hairy grama (*B. hirsuta*), and cane bluestem (*Bothriochloa barbinodes*) were the dominant species at bedsites of fawns 1 to 4 weeks of age. Cane bluestem and sideoats grama were the tallest species, averaging 52 and 42 cm in height, respectively. Blue grama (*B. gracilis*), tobosa grass (*Hilaria mutica*), and black grama were the species that occurred most often at bedsites of fawns 4 to 8 weeks of age. Cane bluestem, threeawns (*Aristida* spp.), sideoats grama, and tobosa grass had average heights of 46 cm, 38 cm, 41 cm, and 43 cm, respectively. Cover characteristics of the bedsites were taller than cover characteristics of the surrounding area ($P < 0.015$) for fawns less than 4 weeks of age, but were the same for fawns over 4 weeks of age. Shrubs were not a major component of any bedsite. Management of areas used by fawns less than 4 weeks of age may be critical to young survival.

Pronghorn antelope fawns are known to lie in seclusion up to 90% of the daytime hours during the first few weeks of life (Buechner 1950, Fichter 1974, Kitchen 1974). Autenrieth and Fichter (1975) discussed the behavior of the fawn when selecting daytime bedsites. The fawn's apparent examination of the vegetation or ground surface was noted, and on several occasions a fawn would lie down in several different areas before a bedsite was finally chosen. Fawn bedsites in Montana (Pyrah 1974) and Idaho (Autenrieth 1976) were reported as being dominated by big sagebrush (*Artemisia tridentata*). Sagebrush heights in these areas ranged from 25 to 50 cm. Bedsite information has not been reported for habitats, such as desert grassland areas, in which sagebrush is not a major habitat component. A study of pronghorn antelope-fawn mortality in the Trans-Pecos region of Texas provided an opportunity to locate and measure fawn bedsites (Tucker and Garner 1980) in such a habitat.

Study Area

The study area, located northeast of Alpine in Brewster County, Texas (Fig. 1), is a 6,100-ha pasture with topography ranging from nearly level rangelands to gently rolling hills (Fig. 2). The area is a

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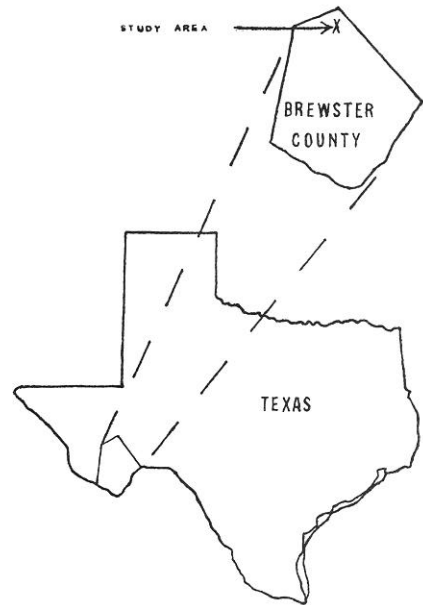


Fig. 1. Location of pronghorn fawn study area in Brewster County, Texas.

desert grassland and receives 30 to 36 cm average annual rainfall, the majority of which occurs between July and September (Martin 1975). Range sites present in the study area are the igneous hill and mountain, gravelly, loamy, and draw range sites (Fig. 3).

Igneous hill and mountain range sites occupy approximately 15% of the study area and occur on rolling to steep hills and mountains with slopes varying from 8 to 30%. Soils are shallow, stoney loams intermixed with coarse igneous gravel and rocks



Fig. 2. Pronghorn fawn study area near Alpine in Brewster County, Texas.

containing frequent boulders and outcrops. Climax vegetation is a mixture of both short and mid-grasses with sideoats grama, cane bluestem, blue grama, and black grama as the major grass species (Soil Conservation Service 1978, unpublished data).

Gravelly range sites make up approximately 75% of the study area. Topography is level to gently rolling hills. Soils are shallow to moderately deep gravelly loams. Vegetation is dominated by short and mid-grasses, with mid-grasses being found in areas with higher moisture regimes. Major grass species are sideoats grama, cane bluestem, and green sprangletop (*Leptochloa dubia*). If overgrazing occurs, these species decrease and shorter grasses, such as tobosa grass, blue grama, and black grama increase (Soil Conservation Service 1978, unpublished data).

Loamy range sites, with deep, fine textured loam soils, occur on approximately 5% of the study area. Grass species are primarily short and mid-grasses with sideoats grama, cane bluestem, green sprangletop, and vine mesquite (*Panicum obtusum*) dominating sites in excellent condition. Blue grama, black grama, and tobosa grass increase if overgrazing occurs (Soil Conservation Service 1978, unpublished data).

Draw range sites consist of narrow, frequently flooded areas on approximately 5% of the study area. Soils are deep loams with high water-holding capacities. These sites are dominated by short to mid-grasses with an intermittent overstory of shrubs and trees. Grasses include sideoats grama, cane bluestem, alkali sacaton (*Sporobolus airoides*), vine mesquite, and green sprangletop. Trees and shrubs include spanish walnut (*Juglans microcarpa*), cottonwood (*Populus sargentii*), Apache-plume (*Fallugia paradoxa*), and mesquite (*Prosopis juliflora*). Forbs are also prominent on these sites (Soil Conservation Service 1978, unpublished data).

Materials and Methods

Fawns were captured using a nighttime capture technique (Browlee and Hailey 1970) and fitted with radio transmitters. Age of captured fawns was determined by techniques described by Tucker and Garner (1980). Daytime bed sites were located by triangulation and subsequent observation of the bedded fawns. From May through July 1978, 186 daytime bed sites were located. These locations were made between 0800 and 1100 hr, recorded on topographical maps, and the range site was recorded. Chi-square tests (Steel and Torrie 1960) were used to test preferences for daytime bed sites located on different range sites by fawns less than 30 days of age and by fawns greater than 30 days of age.

Thirty bed sites of fawns less than 30 days of age and 30 bed sites of fawns greater than 30 days of age were located at random during May, June, and July, 1978. Bed sites of fawns less than 30 days of age were termed "fawning area" bed sites, and bed sites of fawns greater than 30 days of age were termed "fawn rearing area" bed sites.

Each bed site was divided into 2 areas. The exact location of the bedded fawn was considered the bed site. The area immediately surrounding the bed site was considered the bed site area. In order to avoid disturbing fawning areas, bed site sampling was conducted after most fawns had reached 30 days of age. Less than 1 cm of precipitation fell between bed site location and subsequent sampling. Significant changes in vegetation were not apparent during this 6 week period.

Bed sites were sampled using the bed site as the center of 4 radii, each radius being placed along the slope and perpendicular to the slope. Ten 20 × 50-cm frames (Daubenmire 1959) were sampled at 20-cm intervals along each radius. Within each frame, the vertical heights of the tallest plant species (grass, forb, shrub) and/or rock were measured to the nearest 5 cm. The 4 most dominant plant species within each frame were ranked in order of dominance. Dominance of individual plant species was determined by ocularly estimating the amount of biomass present, basal diameter, and vertical height. In all instances the dominance of a plant was based on those plants found in each individual frame. This information was compiled to identify the dominance and frequency of plant species surrounding the bed site.

The first 2 frames in each radius (frames nearest the bed site) were examined and compared statistically to the remaining 8 frames in each radius, using the averaged heights of the 4 cover measurements (grass, forb, shrub, and rock). The mean height of cover characteristics at the bed site were compared to the mean height of the cover characteristics found immediately surrounding the bed site. A *t*-test was used to test whether or not fawns were selecting daytime bed sites with taller plant cover (Steel and Torrie 1960).

Result and Discussion

Range Sites of Daytime Bed Sites

Igneous hill and mountain range sites were selected significantly more often ($P < 0.05$) as daytime bed sites by fawns less than 4 weeks old (Table 1). Of the 132 daytime bed sites of fawns less than 30 days of age, 69% were found on igneous hill and mountain range sites. Fawns less than 30 days old also utilized the gravelly, draw, and loamy range sites as daytime bed sites (Table 1), but at rates less than expected by their representation of total area.

When fawns were 4 to 6 weeks old, they gradually moved to the lower hills and flats where they formed fawn/doe social groups (Autenrieth and Fichter 1975). The gravelly range sites were selected in 43 of 54 daytime bed site locations (80%). At this age, fawns did not utilize the igneous hill and mountain range sites any more than would occur with normal distribution of bed sites ($P < 0.10$). The draw and loamy range sites were not utilized as daytime bed sites by fawns over 4 weeks old (Table 1).

Beale and Smith (1973) found that areas near washes or draws were frequently used by predators and a number of predator-involved mortalities occurred when fawns were bedded nearby. Predation by coyotes and bobcats may have attributed to the draw and loamy range sites not being utilized as bed sites.

Table 1. Range sites and their use as antelope fawn daytime bed sites in Brewster County, Texas, 1978.

Range site	% of study area	% of bed site locations	
		Fawns <30 days old	Fawns >30 days old
Igneous Hill and Mountain	15	69 ¹	20
Gravelly	75	27 ²	80
Loam	5	3	0
Draw	5	1	0

¹Chi-squared test ($P < 0.05$) indicates use above expected if use were proportional to availability.

²Chi-squared test ($P < 0.05$) indicates use below expected if use were proportional to availability.

Daytime Bed Sites in Fawning Areas

Black grama, sideoats grama, hairy grama, and cane bluestem were the most frequent species surrounding the 30 daytime bed sites analyzed in fawning areas (Table 2). Cane bluestem was the tallest species, averaging 52 cm in height. Sideoats grama, black grama, and hairy grama averaged 42 cm, 18 cm, and 17 cm in height, respectively. Black grama was considered the dominant species at daytime bed sites, with sideoats grama second in dominance.

Mesquite, sacahuista (*Nolina microcarpa*), javalina bush (*Condalia ericoides*), and catclaw (*Mimosa biuncifera*) were shrub species that occurred at these bed sites, and had a combined frequency of 1%. The mean height of these shrub species was 51 cm. Shrubs were not a major vegetation component around daytime bed sites.

Rocks occurred around all daytime bed sites in fawning areas. Heights ranged from 0 to 45 cm, with the average height being 5 cm. Slope averaged 6% and ranged from 0 to 14%.

Daytime Bed Sites in Fawn Rearing Areas

Blue grama, tobosa grass, black grama, and muhly (*Muhlenbergia* spp.) composed 53% of the species recorded around daytime bed sites in fawn rearing areas (Table 3). Cane bluestem was the tallest plant, with a mean height of 46 cm. Threecawn, sideoats

Table 2. Dominance rankings and frequency of grass species around daytime bedsites of pronghorn antelope fawns in fawning areas, Brewster County, Texas, 1978.

Species	Dominance ranking				% Frequency
	1	2	3	4	
Threeawns (<i>Aristida</i> sp.)	47	13	19	1	6.6
Black grama (<i>Bouteloua eriopoda</i>)	495	217	43	3	63.1
Blue grama (<i>Bouteloua gracilis</i>)	15	26	12	1	4.5
Cane bluestem (<i>Bothriochloa barbinodes</i>)	104	76	13	0	16.0
Fall witchgrass (<i>Leptoloma cognatum</i>)	0	12	11	1	2.0
Hairy grama (<i>Bouteloua hirsuta</i>)	76	174	56	1	25.6
Hairy tridins (<i>Tridens pilosus</i>)	10	41	21	2	6.1
Little bluestem (<i>Schizachyrium scoparium</i>)	9	1	0	0	0.8
Muhly (<i>Muhlenbergia</i> sp.)	2	4	0	0	0.5
Plains bristlegass (<i>Setaria macrostachya</i>)	1	0	1	0	0.2
Sideoats grama (<i>Bouteloua curtipendula</i>)	356	213	42	0	50.9
Sprucetop grama (<i>Bouteloua chondrosioides</i>)	2	9	11	0	1.8
Tanglehead (<i>Heteropogon contortus</i>)	14	3	0	0	1.4
Texas grama (<i>Bouteloua rigidiseta</i>)	1	2	0	0	0.2
Vine mesquite (<i>Panicum obtusum</i>)	0	0	1	0	0.1
Woolspike (<i>Elyonurus barbiculmis</i>)	1	0	0	0	0.1

grama, and tobosa grass averaged 38 cm, 41 cm, and 43 cm in height, respectively. Blue grama was the dominant plant around daytime bedsites and tobosa grass was second in dominance.

Javalina bush and yucca (*Yucca torreyi*) were the only shrub species occurring around daytime bedsites in fawn rearing areas. These species were relatively infrequent (less than 1%). Mean height of these species averaged 26 cm. Shrubs did not appear to be an important vegetative component at daytime bedsites.

Rocks occurred at or near all daytime bedsites in fawn rearing areas. Rock heights ranged from 0 to 30 cm, with the average height being 5 cm. Slope ranged from 0 to 13% averaging 2%.

Table 3. Dominance rankings and frequency of grass species around daytime bedsites of pronghorn antelope fawns in fawn rearing areas, Brewster County, Texas, 1978.

Species	Dominance ranking				% Frequency
	1	2	3	4	
Threeawns (<i>Aristida</i> sp.)	52	38	22	0	9.33
Black grama (<i>Bouteloua eriopoda</i>)	231	70	9	0	25.83
Blue grama (<i>Bouteloua gracilis</i>)	363	197	21	1	48.50
Buffalo grass (<i>Buchelo dactyloides</i>)	3	5	1	0	0.75
Burro grass (<i>Scleropogon brevifolius</i>)	19	18	5	0	3.50
Cane bluestem (<i>Bothriochloa barbinodes</i>)	14	13	8	1	3.00
Chloris (<i>Chloris virgata</i>)	25	35	5	1	5.50
Fall witchgrass (<i>Leptoloma cognatum</i>)	4	6	7	1	1.50
Hairy grama (<i>Bouteloua hirsuta</i>)	49	56	12	0	9.75
Hairy tridins (<i>Tridens pilosus</i>)	6	40	23	0	5.75
Muhly (<i>Muhlenbergia</i> sp.)	66	65	12	2	12.08
Sideoats grama (<i>Bouteloua curtipendula</i>)	46	41	7	1	7.92
Sprucetop grama (<i>Bouteloua chondrosioides</i>)	1	1	1	1	0.25
Tobosa grass (<i>Hilaria mutica</i>)	272	39	6	0	26.41
Tumblegrass (<i>Schedonnardus paniculatus</i>)	1	5	0	0	.50
Vine mesquite (<i>Panicum obtusum</i>)	17	14	10	0	3.42
Woolspike (<i>Elyonurus barbiculmis</i>)	0	0	1	0	0.08

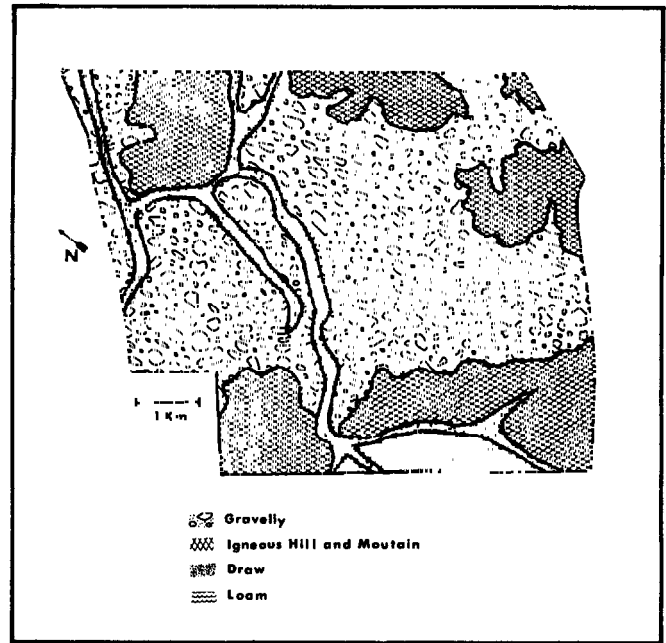


Fig. 3. Range sites on a pronghorn antelope research area near Alpine in Brewster County, Texas, 1978.

Daytime Bedsites Versus Daytime Bedsite Areas

Fawns less than 4 weeks old selected bedsites that had significantly taller cover characteristics at the bedsites than in the surrounding area (19 ± 0.67 cm averaged height at the bedsites vs. 17 ± 0.27 cm averaged height away from the bedsites, $t = 3.877$, 29 df, $P < 0.05$). Plants at the bedsites were taller than plants that surrounded the bedsites. Heights of cover characteristics at and surrounding daytime bedsites in fawn rearing areas (fawns 4 to 8 weeks of age) were compared; however, no statistical differences were detected (13 ± 1.03 cm at the bedsites vs. 15 ± 1.12 cm surrounding the bedsites, $t = 0.563$, 29 df, $P > 0.05$). These data indicate that antelope fawns in the Trans-Pecos tend to select daytime bedsites with taller cover characteristics until they reach 4 weeks of age, but did not show this preference from 4 to 8 weeks of age.

Autenrieth and Fichter (1975) found that fawns were selective in choosing areas with greater brush canopy cover, total coverage, and brush height. Brush, however, was not an important component at fawn bedsites in Texas. In Idaho, an average vegetation height of 41.9 cm has been reported at fawn bedsites (Autenrieth 1976). These data are comparable to mean vegetation heights of 42.6 cm in the fawning areas in the Trans-Pecos study area.

The height of vegetation or a combination of the various cover characteristics of the area are an important factor in the fawn's selection of a bedsites. In some areas of the Trans-Pecos where antelope populations are low, proper management of fawning areas could be beneficial to fawn survival. Barrett (1981) found that habitat diversity provided by sagebrush (*Artemisia* sp.), small depressions, and stands of grasses or forbs greater than 25 cm tall constituted important bedding cover and contributed to fawn survival. During this study, predation concentration on young fawns was determined to be a major limiting factor (Tucker and Garner 1980), with 60% of the fawns being lost due to predation during the first 6 weeks of life. Cane bluestem and sideoats grama are species which occur most often at and near young fawn's daytime bedsites. Although these species provide concealment for the fawn, they are also highly desirable livestock forages. Reduction of these species by grazing may affect fawning survival by reducing concealment cover for the fawns.

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POSITION ANNOUNCEMENT

Position:

Extension Range Management Specialist in Morocco.
Two year contract on a year by year basis.

Desired Qualifications:

Ph.D. in Range Science with international experience.
Interest and experience in extension demonstration,
application of range management practices, and applied
research.

Desired Language Capability:

English, French and Arabic

Location:

Range extension work in the Ait Rbaa area near Beni Mellal, Morocco. Living accommodations in Beni Mellal, a small comfortable Moroccan town at the foothills of the High Atlas Mountains. Beni Mellal is a traditional Moroccan town located 250 kilometers inland from the capitol city of Rabat. An American School for pre-school through high school is located in Rabat.

Responsibilities:

The project centers around extension demonstration programs. All project activities focus on these demonstrations and use of them to encourage the acceptance of range management in Morocco. To the end, daily activities will be devoted toward developing and delivering training programs designed for various local audiences. In collaboration with Moroccan counterparts, this

person will compile basic resource/user inventories, evaluate range management techniques and practices, establish demonstrations of range management techniques and practices, and develop range management extension programs for range extension locations.

Salary and Benefits:

Salary negotiable and commensurate with responsibilities, qualifications and experience. Benefits totaling approximately 27% of salary, provided by Utah State University, include TIAA/CREF retirement at 14.2% of salary, a comprehensive life and medical insurance program that is honored worldwide, workers compensation, tuition reduction for college age children attending Utah State University, twenty two days of annual leave per year, and twelve days per year sick leave.

Closing Date:

April 1, 1983, or until a suitable candidate is identified.

Application:

Letter of application, a resume of professional experience, and letters of reference from at least five individuals familiar with the candidate's professional competence should be sent to *James T. O'Rourke, Range Science Department, UMC 52, Utah State University, Logan, Utah, 84322.* Utah State University is an EEO/AA employer.