SITE PREFERENCE BY CATTLE UNDER SHORT DURATION AND CONTINUOUS GRAZING MANAGEMENT

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ABSTRACT

Cattle locations were monitored by radio tracking on a South Texas study area to determine if site utilization was more uniform under short-duration versus continuous grazing management. Site variables compared with the distribution of cattle locations were vegetation type, soil series, and distance to water. Use of vegetation type was more uniform under short duration grazing. However, cattle showed more selection for soil series and distance to water under short duration as compared to continuous grazing. Thus the bulk of the evidence did not support a hypothesis of more uniform site utilization by cattle under short duration grazing management.

INTRODUCTION

Short duration cattle grazing has been increasing in the southwestern U.S. (Westmoreland et al., 1981; Allison, 1983; Moseley, 1983). This type of grazing management typically involves a single herd of cattle rotated through eight or more paddocks. Cattle are moved to a new paddock every few days, resulting in periods of grazing deferral of from 45-60 days per paddock. The most controversial hypothesis connected with short duration grazing (SDG) is that stocking rate can be increased over that which is ordinary with conventional grazing management. Heitschmidt and Walker (1983:148) speculated that: "By utilizing short duration grazing and thus increasing stocking density, livestock distribution will be enhanced which will improve the ability of livestock to search all areas of a pasture and more effectively utilize all available forage. In addition, grazing pressure will become more uniform throughout the pasture and thus control of the frequency and severity of defoliation of all plants will be enhanced."

In the present study, we tested the hypothesis that cattle distribution in relation to vegetation type, water, and soil series would be improved in a SDG grazing cell versus an adjacent continously grazed pasture on a South Texas study area.

MATERIALS AND METHODS

The study was conducted on a 3,000-acre area managed under SDG and an adjacent continuously grazed (CG) area of 6,000 acres on the Encino Division of the King Ranch, Brooks County, Texas. The area has flat to gently rolling terrian and lies in the Rio Grande Plain vegetation region (Frances et al., 1966). The area is classified as semiarid (Visher, 1954) because the 24 inch mean annual precipitation is exceeded by the 58.5 inch open-pan evaporation.

Honey mesquite (**Prosopis glandulosa**) was the dominant woody vegetation on the study area, with scattered mottes of live oak (**Quercus virginianus**), and small stands of hercules club (**Zanthoxylum clava-herculis**), brazil (**Condalia obovata**), and prickly pear (**Opuntia** spp.). Grass species included thin paspalum (**Paspalum setaceum**), sandbur (**Denchrun incertus**), seacoast bluestem (**Schizachrium scoparium** var. **littoralis**), threeawns (**Aristida** spp.), and Texas grass (**Vascyochloa multinervosa**). Important forbs included sunflowers (**Helianthus** spp.), crotons (**Croton** spp.), dayflower (**Commelina erecta**), camphor weed (**Heterotheca subaxilaris**), milkpea (**Galactia canescens**), ragwort (**Senecio ridelli**), scratch daisy (**Croptilon divaricatum**), and milkweed (**Sarcostema cynocoides**) (A. Garza, unpubl. data, Tex. A&I, Kingsville, TX).

Soils on the study area are deep, level to undulating fine sands of the Sarita, Nueces, and Falfurrias associations (U.S. Soil Conserv. Serv., unpubl. data, Falfurrias, TX). The study area has the Falfurrias, Sarita, Sauz, Sarita-Sauz, and Nueces soil series.

The SDG treatment was initiated in November 1983 after eight paddocks (284-445 acres) were fenced with two-strand electric fencing. Previously, the SDG and CG area had been continuously grazed at about 17 acres/Animal Unit(AU) for many years. The SDG and CG areas were stocked with cattle at 11 acres/AU and 18 acres/AU, respectively. Stocking rate in the SDG area was reduced to 21 acres/AU in October 1984 as a result of drought. Stock density in paddocks being grazed in the SDG area ranged from 1.1 to 1.8 acres/AU, prior to October 1984, and 2.1 to 3.3 acres/AU thereafter. In the SDG area, cattle were rotated to a new paddock every 4-7 days.

Cattle distribution was determined between 15 February 1984 and 10 January 1985 by radio tracking six cows in each of the two grazing treatments. Radio transmitters were attached to a collar carried by each animal. Bearings to instrumented cattle were taken with radio receivers hooked to permanent null antennas arranged in a pentagonal configuration (White, 1985) in the SDG area, and a triangle in the CG area. Each antenna was tested for accuracy by taking 10 bearings from six to ten known beacon locations (White, 1985). Devations from the actual bearings were used to estimate system accuracy (Tester and Siniff, 1965). Average bearing deviation for antennas ranged from $\pm$ 0.61 to 2.03 degrees. Cattle locations were established from simultaneous bearings from three antennas. We concentrated on location accuracy at the expense of obtaining a larger sample.

Cattle were generally radio-tracked three times/week. Tracking was evenly distributed through daylight hours. The beginning of a tracking session involved selecting three antennas from which observers scanned for cattle. After animals in the vicinity were located, observers moved to several different sets of three antennas and repeated the process until all or most animals were located. Using the Autocad Engineering Package (version 2.1, Autodesk Inc., Sausalito, CA), the study area was drawn on a micro computer and overlaid with a grid of 10 acre blocks. The triangulation software program developed by White (1985) was used to determine grid coordinates from individual bearings and to exclude erroneous bearings. Thus cattle locations were assigned to grid blocks on the study area.

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Each grid block was also categorized by the vegetation type and soil series covering the largest percentage of the block, and by distance to the nearest water. Vegetation types were mesquite, cordgrass, mesquite-prairie, prairie, oak motte, and oak regrowth. Soil series were Falfurrias, Sarita-Sauz, Sauz, Sarita, and Nueces. Distances to water were considered in 400-yard intervals. Aerial photographs and soil maps were used to categorize blocks.

Null hypotheses that cattle locations were distributed in proportion to the number of SDG or CG grid blocks containing each vegetation type, soil series, or water-distance interval were tested by Chi-square analysis at $P = 0.10$ (Nue et al., 1974). If a null hypothesis was rejected, a further test was conducted at $P = 0.10$ to determine if the range area in question was preferred or avoided by cattle.

RESULTS AND DISCUSSION

Locations per cow averaged 73 (range 64-85) in the SDG area and 37 (range 27-43) in the CG area.

Cattle used vegetation types in relation to their occurrance in the SDG area but avoided the mesquite, oak motte, and cordgrass types in the CG area (Table 1). This pattern was in agreement with the hypothesis of Heitschmidt and Walker (1983). However, more selection was shown in the SDG area for soil series (Table 2) and distance to water (Table 3), as compared to the CG area.

Table 1. Preference for vegetation types by cattle radio-tracked in a short-duration grazing cell and adjacent continuously grazed pasture, King Ranch, Brooks County, Texas.

	Short duration			Continuous		
Vegetation types	% available	% use	Preference[a]	% available	% use	Preference[a]
Mesquite prairie	0.15	0.16	None	0.12	0.16	None
Mesquite	0.17	0.20	None	0.03	0.01	Avoid
Prairie	0.60	0.56	None	0.63	0.70	None
Oak motte	0.05	0.05	None	0.04	0.01	Avoid
Cordgrass	0.03	0.02	None	0.07	0.02	Avoid
Oak regrow	0.01	0.01	None	0.13	0.11	None

[a]Neu et al. (1974), $P < 0.10$.

Table 2. Preference for soil series by cattle radio-tracked in a short-duration grazing cell and adjacent continuously grazed pasture, King Ranch, Brooks County, Texas.

	Short duration			Continuous		
Soil series	% available	% use	Preference[a]	available	% use	Preference[a]
Falfurrias	0.33	0.27	Avoid	0.27	0.19	Avoid
Sarita-Sauz	0.35	0.43	Prefer	Not present		
Sauz	0.03	0.00	Avoid	Not present		
Sarita	0.27	0.29	None	0.49	0.51	None
Nueces	0.03	0.01	Avoid	0.24	0.31	None

[a]Neu et al. 1974, $P < 0.10$.

In the SDG area, the Sarita-Sauz series was preferred, the Sarita was used in relation to occurrance, and all others were avoided. In the CG area, the Falfurrias series was avoided and all others used in relation to occurrance. The different pattern of preference for vegetation type versus soil series is surprizing since the two are usually correlated. Much of the study area was root plowed about fifteen years ago and vegetation types may still be influenced more by this disturbance than by underlying soil series.

Table 3. Preference for distance (yds) from water by cattle radio-tracked in a short-duration grazing cell and adjacent continuously grazed pasture, King Ranch, Brooks County, Texas.

	Short duration			Continuous		
Distance to water	% available	% use	Preference[a]	% available	% use	Preference[a]
< 400	0.04	0.13	Prefer	0.06	0.07	None
400-800	0.13	0.21	Prefer	0.19	0.18	None
801-1200	0.21	0.20	None	0.26	0.30	None
1201-1600	0.29	0.17	Avoid	0.26	0.31	None
1601-2000	0.18	0.20	None	0.16	0.14	None
2001-2400	0.10	0.07	None	0.05	0.00	Avoid
>2400	0.05	0.02	Avoid	0.02	0.01	None

[a]Nue et al. (1974), $P < 0.10$.

Distance from water influenced cattle perference for site more in the SDG area as compared to the CG area. In the SDG area, the only available water was at the cell center. Cattle in the SDG area spent much more time within 800 yards of water than was the case in the CG area. There was a trend in both grazing treatments to avoid areas at extreme distance from water.

Thus, in this study, the bulk of the evidence did not support the hypothesis that cattle used the SDG area more uniformly. If anything, there was more selection for site in SDG as compared to CG. Caution should be employed in extending these results, however. This was a single, unreplicated study. Furthermore, the study was conducted in a drought, which could have influenced results. Finally, SDG grazing decisions depend considerably on the individual manager and it is difficult, if not impossible, to standardize this variable between sites where SDG is practiced.

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