Continuous and Rotation Grazing on Buffalo and Tobosa Grassland

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ROTATION grazing trials were undertaken at the Texas Agricultural Experiment Station, Spur, Texas in 1942 to determine the value of using an intensive grazing period followed by a 2 month rest during the summer months to improve the productivity of native buffalo and tobosa grassland. These grazing studies were undertaken primarily because earlier clipping experiments of buffalo grass and blue grama at Spur indicated that these grasses produced the highest yields of forage when harvested at intervals of 8 weeks (Dickson, et al, 1948).

Description of Area

The land available for these grazing trials is located in the Southern Rolling Plains Region of Texas and is typical of gently rolling native grassland. The soils range from heavy clays to clay loams of the Abilene and Tillman series. The vegetation consists primarily of buffalo grass (*Buchloe dactyloides*), tobosa grass (*Hilaria mutica*), vine mesquite (*Panicum obtusum*), and minor amounts of purple three-awn (*Aristida purpurea*), side-oats grama (*Bouteloua curtipendula*), blue grama (*Bouteloua gracilis*) and trace amounts of other species. The principal woody plants, mesquite (*Prosopis juliflora glandulosa*) and lote (*Condalia obtusfolia*), were removed prior to the trials. Stock water of good quality from deep wells was available in all pastures. Salt was provided as needed and DDT was used at monthly intervals to control horn flies. No supplemental feed was used.

Methods and Procedure

A quarter-section of native grassland was divided into 16 ten-acre pastures and 5 of these pastures were used for a comparison between rotation and continuous use, while the remaining ones were used for other grazing experiments including intensity of use, different vegetative covers and contour furrowing. An ocular survey of vegetation and a soil survey map were made of the pastures and the information was used to select reasonably comparable pastures for each of the treatments. The grazing treatments for individual pastures were obtained by random sampling. Further detailed analysis of the vegetation in each pasture was made prior to the grazing trials by establishing 9 line transects, 10 meters long, at equidistant points in each of the pastures. Determinations were made of vegetal composition and basal density in April of 1942 and again in July of 1947, using the method developed by Parker and Savage (1940). Observations of the utilization of forage plants and grazing habits of the steers were made at monthly intervals throughout the season. Moisture penetration tests were also made following torrential rains at irregular intervals.

Good quality Hereford yearling steers, weighing an average of 550 to 750 pounds, were used to graze the pastures. They were weighed on two consecutive days and graded at the beginning and at the close of each grazing season. Single day weights were taken at monthly intervals. The grazing season generally began May 1 and extended to October 1, but length of season varied depending on the desired utilization and condition of the forage.

Results

The vegetation on the rotation grazed pastures had a somewhat higher content of tobosa and vine mesquite, but any desirable changes that occurred between the initial readings in April 1942 and July 1947 favored continuous moderate stocking. As shown in Table 1, there was very little change in the vegetal composition of the more desirable forage plants and an increase of only 2.7 percent in basal cover on the rotation pastures. There was a marked increase from 54.8 to 73.0 percent in buffalo grass and an increase of 6.5 percent in basal cover on the continuous grazed pastures from 1942 to 1947. Other grass species showed minor changes although some might be considered indicative over a longer period of study. There was also a marked tendency for the rotation grazed pastures to have a higher percentage of annual broomweeds and other annuals including sunflowers and Russian thistles.

TABLE 1

Composition of vegetation and basal density of principal species on rotation and continuous grazed pastures, 1942–1947

GRAZING TREATMENT	SEASON	NO. LINE TRANSECTS	AVERAGE PERCENT COVER BY SPECIES[1]									PERCENT BASAL COVER
			Bd	Hm	Po	Bc	Ap	Bg	Oh	Gs	Gd	
Rotation	1942	27	49.9	36.7	1.9	.6	1.2	.8	.5	.9	.2	15.6
Rotation	1947	27	53.5	35.0	2.2	.7	2.0	.9	.2	.2	.4	18.3
Difference			3.6	−1.7	−.3	.1	.8	.1	−.3	−.7	.2	2.7
Continuous	1942	18	54.8	16.4	11.10	T	3.5	2.2	.2	.4	.1	14.3
Continuous	1947	18	73.0	12.5	5.0	.4	2.8	1.2	.1	.1	T	20.8
Difference			18.2	−3.9	−6.1	.4	−.7	−1.0	−.1	.3	−.1	6.5

[1]

Species symbol	Scientific name	Common name
Bd	*Buchloe dactyloides*	Buffalo grass
Bg	*Bouteloua gracilis*	Blue grama
Ap	*Aristida purpurea*	Three awn
Hm	*Hilaria mutica*	Tobosa grass
Po	*Panicum obtusum*	Viney mesquite
Bc	*Bouteloua cortipendula*	Side oats grama
Oh	*Opuntia humifusa*	Prickly pear
Gs	*Gutierrezia sarothrae*	Perenniel broomweed
Gd	*Gutierrezia dracunculoides*	Annual broomweed

The rotation and continuous grazed pastures were stocked at a moderate rate for the season to utilize 50 percent of available forage.

The system of rotation grazing consisted of grazing each pasture intensively for one month and resting it for two succeeding months. By use of a three pasture arrangement the same steers were used each month on a pasture which had not been grazed during the two previous months. On continuously grazed pastures the same steers remained on each pasture for the entire summer grazing period.

Utilization records of forage plants at

TABLE 2

Depth of moisture penetration on rotation and continuous grazed pastures following a torrential rain of 3.33 inches, June 19, 1946

GRAZING TREATMENT	NO. SAMPLES TAKEN	RAINFALL, INCHES	DATE SAMPLED	AVE. DEPTH MOISTURE PENETRATION, INCHES	
				Buffalo grass	Tobosa grass
Rotation	27	3.33	July 12, 1946	8.43	20.10
Continuous	18	3.33	July 12, 1946	14.50	27.56

TABLE 3

Summary of gains of yearling steers on rotation and continuous grazed pastures during the summer months, 1942–1947

SEASON	GRAZING TREATMENT	LENGTH OF GRAZING SEASON	ACRES PER HEAD	AVERAGE GAINS, POUNDS		
				Steer	Acre	Daily
1942	Rotation	196	3.94	142	36	.73
1943	Rotation	160	5.20	183	35	1.14
1944	Rotation	117	3.94	173	33	1.48
1945	Rotation	160	5.02	107	21	.67
1946	Rotation	92	5.01	26	5	.28
1947	Rotation	151	10.30	143	14	.66
1948	Rotation	154	10.30	126	12	.82
1949	Rotation	181	10.30	171	17	.95
Average		151	6.02	132	22	.87
1942	Continuous	196	4.26	151	35	1.77
1943	Continuous	160	4.94	163	33	1.02
1944	Continuous	117	4.94	177	36	1.51
1945	Continuous	160	5.07	156	31	.97
1946	Continuous	92	5.07	34	7	.38
1947	Continuous	151	6.76	114	17	.76
1948	Continuous	154	10.14	138	14	.90
1949	Continuous	181	7.56	146	19	.81
Average		151	5.67	135	24	.90

TABLE 4

Average annual acre gain by months on rotation and continuous grazed pastures, 1942–1949

GRAZING TREATMENT	LENGTH GRAZING SEASON	AVERAGE ANNUAL ACRE GAIN, POUNDS BY MONTHS						AVE. ANNUAL GAIN	AVE. PERCENT UTILIZATION OF FORAGE
		May	June	July	August	September	October		
Rotation	151	11.03	1.38	4.11	3.07	1.49	.76	21.84	54
Continuous	151	10.73	4.18	4.18	2.61	.98	1.17	23.85	52

monthly intervals over the 5-year period strongly suggested that rotational grazing in a fixed plan may well penalize buffalo grass, side oats grama and other species with a long period of palatability when growing in close association with tobosa grass that has a rather limited season of palatability. Under good moisture conditions and during the early summer season the differential grazing of

steers was of only minimum importance but became increasingly more important as the season progressed, especially during periods of drought. In several instances, intensive use, coupled with a drought prior to a torrential rain, reduced the cover of the more palatable species on rotation grazed pastures well below that required for rapid absorption of rainfall (Table 2). From the data it is apparent that buffalo grass suffered the greatest reduction in moisture penetration under rotation grazing, although some loss occurred even from tobosa which usually has a good vegetative cover and litter left after heavy use.

From the standpoint of gains of yearling steers, continuous moderate grazing showed some slight advantage over rotation grazing (Table 3). These differences are relatively small considering the variation in length of grazing season due to drought and inherent variation in pastures. The lighter stocking rate used on rotation grazed pastures during the seasons of 1947 and 1949 was thought desirable to allow these pastures to recover following the severe droughts of 1947 and 1948.

An analysis of gains at monthly intervals during the grazing season indicates that a somewhat more uniform rate of gain was made by steers on continuously grazed pastures (Table 4). This data, however, is based on single day weights and cannot be considered too reliable under pasture conditions.

Summary

1. Rotation grazing of buffalo and tobosa grass growing in close association did not improve the vegetal composition or increase the desirable forage plants.

2. Rotation grazing brought about a marked differential use of buffalo grass and tobosa as the season progressed or in case of drought, and in some instances resulted in higher runoff and decreased moisture penetration on sites occupied by the more desirable species.

3. Gains of yearling steers were not increased by use of a fixed rotation grazing system when compared with continuous moderate use.

LITERATURE CITED

1. Dickson, R. E., C. E. Fisher, and P. T. Marion. 1948. Summer grazing experiments on native grassland. Tex. Agr. Expt. Sta. Prog. Rept. 1123.
2. Parker, K. W., and D. A. Savage. 1940. Use of Line transect method for determining composition and basal density of range vegetation. Forage Crops Gazette. Sept.