Different Methods of Managing Bluestem Pasture, 1963 (Projects 253-3-5).

E. F. Smith, K. L. Anderson, F. W. Boren, and C. L. Drake

This experiment was designed to determine the effect of different stocking rates, of deferred grazing, and of pasture burning on cattle performance, productivity of pastures and range condition as determined by plant population changes. In addition to the yearly report, a summary of cattle gains for the past 14 years is included.

Experimental Procedure

Two-year-old Hereford steers with an average U.S.D.A. feeder grade of about high good were used in 1963. They were purchased as calves near Fort Davis, Texas, and received prairie and alfalfa hay in dry lot during the winter each year. They were used in this study during the summers of 1962 and 1963. They were assigned to pastures on a random-weight basis.

The experimental treatment for each pasture was:

Pasture 1—Moderate stocking rate, 4 acres per steer.

Pasture 2—Overstocked, 2.7 acres per steer.

Pasture 3—Understocked, 6 acres per steer.

Pastures 4, 5, 6—Deferred grazing and burning, moderate stocking rate, 4 acres per steer. The steers were grazed on pastures 4 and 6 from May 7 to July 1. They were then moved to pasture 5 where they remained until September 2, when they were grazed in all three pastures until September 28, close of the trial. Deferred pasture 5 was burned April 25.

Pasture 9—Burned March 14, 1963, moderate rate of stocking.

Pasture 10—Burned April 8, 1963, moderate rate of stocking.

Pasture 11—Burned April 25, 1963, moderate rate of stocking.

The steers were gathered about 3 p.m., held over night without feed or water and weighed the following morning about 8 o'clock. Starting and final weights were obtained after putting all steers together and weighing them in random order.

Observations

Results are reported in Tables 44, 45, 46, and 47.

Compared with pasture 1, which was moderately stocked and not burned, gains were reduced by overstocking, deferring and burning, and early spring burning. Steer gain was greatest on the late-spring burned pasture. There was not much grass to burn on the early-spring burned pasture, the ground was wet, a good wind was available but only about one third of the pasture burned. Forage was also lacking on the mid-spring burned pasture. Although there was a strong wind and it was dry, only the slopes burned, about one half to two thirds of the pasture. Some green vegetation on the late burned pasture (April 25) seemed to aid the fire; about three fourths of this pasture burned. The deferred pasture had a good cover of vegetation and nearly a complete burn was obtained. It was burned in an attempt to improve steer weight gains which have been low under deferred grazing.

Table 44

A comparison of different methods of managing bluestem pastures, May 7, 1963, to September 28, 1963—144 days.

Pasture no.	1	2	3	4, 5, 6	9	10	11
Management	Moderately stocked	Over-stocked	Under-stocked	Deferred and late spring burned*	Early-spring burned	Mid-spring burned	Late-spring burned
No. of steers per pasture	15	22	10	45	11	11	11
Acres in pasture	60	60	60	3-60**	44	44	44
Acres per head	4	2.7	6	4	4	4	4
Initial wt. per steer	730	730	730	736	740	750	750
Gain per steer	202	180	195	170	187	200	233
Daily gain per steer	1.40	1.25	1.35	1.18	1.30	1.38	1.62
Gain per acre	51	65	32	43	47	50	

* Deferred pasture no. 5 was late-spring burned.

** Three 60-acre pastures.

Table 45

Yearly account of summer gains (pounds per steer) under different methods of grazing pastures; 14-year summary, 1950-63, the summer season of approximately 150 days.

Pasture no.	1	2	3	4, 5, 6	9	10	11
Management	Moderately stocked	Over-stocked	Under-stocked	Deferred rotated	Early-spring burned	Mid-spring burned	Late-spring burned
1950	221	210	214	205	216	254	230
1951	242	256	290	234	243	265	254
1952	246	209	228	197	251	278	283
1953	226	194	233	197	205	217	234
1954	261	237	236	214	270	271	306
1955	270	224	253	213	282	305	307
1956	179	184	168	154	212	234	216
1957	243	236	244	209	261	256	279
1958	208	207	207	198	222	270	253
1959	252	241	262	203	254	275	295
1960	267	242	255	235	299	289	314
1961	255	217	227	187	243	245	237
1962	232	177	215	167	201	205	212
1963	202	180	195	170	187	200	233
Average	236	215	230	199	239	255	261

Table 46

Per acre production and disappearance of forage, weeds, and mulch, Donaldson pastures, near Manhattan, Kans., 1963.

Range site		Pasture number 1 (lbs./A.)	2 (lbs./A.)	3 (lbs./A.)	Av. of 4 & 6 (lbs./A.)	5 (lbs./A.)	9[1] (lbs./A.)	10[1] (lbs./A.)	11[1] (lbs./A.)
		Production							
OU	Forage	3402	2167	3688	3573	2604	1268	1711	2079
	Weeds	150	247	183	304	104	194	152	130
	Mulch	2657	2350	2623	3257	540	.....	.....	.....
LB	Forage	2291	1276	3746	3238	1881	1272	1122	1332
	Weeds	262	302	157	169	77	251	168	112
	Mulch	1973	1030	2934	2723	701	.....	.....	.....
		Disappearance (index of amount grazed)							
OU	Forage	1977	1790	1629	1536	1521	721	811	961
	Weeds	77	148	29	105	99	93	60	53
	Mulch	744	855	66	697	97	....	....	....
LB	Forage	693	1074	1193	1334	977	467	370	578
	Weeds	97	183	73	89	15	42	130	93
	Mulch	772	485	tr	574	251	....	.....	....
		Remainder (amount left ungrazed at end of season)							
OU	Forage	1425	377	2059	2037	1083	574	900	1118
	Weeds	73	99	154	199	14	101	92	77
	Mulch	1913	1495	2557	2560	443	.....	....	....
LB	Forage	1598	202	2553	1904	904	805	752	578
	Weeds	165	119	84	100	62	209	38	19
	Mulch	1251	545	2934	2149	450	.....	.....	.....

1, No mulch in pastures 9, 10, and 11, burned annually, and very little in 5, burned in 1963 before deferment.

Table 47
Grass decreasers and grass increasers given as percent of total vegetation and estimated range condition in percent of "original" vegetation.

Range site		Pasture number 1 (%)	2 (%)	3 (%)	4 & 6 Av. (%)	5[1] (%)	9[2] (%)	10[2] (%)	11[2] (%)
OU	Grass decreasers ..	47	33	38	48	56	42	71	72
	Grass increasers ..	33	39	40	36	29	30	15	14
	Range condition ..	62	48	51	62	72	55	86	85
LB	Grass decreasers ..	62	44	56	62	62	47	68	82
	Grass increasers ..	26	32	30	23	24	27	18	15
	Range condition ..	80	65	75	79	81	68	88	97

1. Burned late spring, 1962, before deferment.
2. Burned annually, early, mid-, and late spring, respectively.

The Effects of Feeding Different Levels of Dicalcium Phosphate to Heifers on Bluestem Pasture (Project 253-2).

C. L. Drake, E. F. Smith, H. G. Spies, D. Richardson, and D. L. Good

This trial was designed to study effects of low to high levels of calcium and phosphorus supplements on heifers grazing bluestem pasture.

February 18, 1961, 40 Hereford heifer calves, weighing about 400 pounds each, were randomly divided into four groups and turned into a 140-acre pasture. Each morning the heifers were gathered, divided into four lots and fed the experimental rations shown in Table 49. The chemical analysis is presented in Table 48.

Starting October 5, 1961, the heifers were gathered and fed three times weekly instead of each day; however, the same quantity was fed per week. The heifers were given about 5 pounds of prairie hay per day when snow covered the grass and protein supplement was fed only during winter months. A trace-mineralized vitamin A salt mixture[1] was available at all times and heated water was available during the winter.

Blood samples were obtained at five different intervals during the study and analyzed for calcium and phosphorus. The average for each lot is shown in the following table.

Blood Calcium and Phosphorus Values[1]
(Blood values in mgs. per 100 mls. blood)

Lots		Calcium	Phosphorus
1	(No mineral supplement)	10.33	5.87
2	(Low mineral supplement)	9.95	6.86
3	(Average mineral supplement)	9.92	6.95
4	(High mineral supplement)	9.76	7.50

1. Each value is the average of five samples.

There were no differences between lots in blood calcium; however, there were differences due to season. Highest values were obtained in February, June and August of 1962 while lower values were in December, 1962, and March, 1963. There were significant differences in blood phosphorus between lots and season. Blood phosphorus levels

1. Commercial mixture containing 10% manganese; 10% iron; 14% max.-12% min., calcium; 1% copper; 5% zinc; .30% iodine; .10% cobalt. Two pounds of this mixture were added to 97 pounds of salt containing one pound of vitamin A (10,000 I.U. per gm.).

increased as the supplemental phosphorus increased and blood levels were highest during winter months.

There were no significant differences in hematocrit values between lots.

Average daily gain was not influenced by mineral supplementation; however, there were seasonal differences. In general, the gains were positive from May through October and negative from November through April; however, this depended somewhat on climatic conditions. Average daily gain is shown in Table 49.

The heifers were bred as short two-year-olds in the summer of 1962 and calved in the spring of 1963. Two purebred Hereford bulls with marking harnesses were used and an attempt was made to record the breeding date or dates of each heifer. The heifers were pregnancy checked by rectal palpation for 12 weeks during the breeding season.

There were no significant correlations between blood calcium or blood phosphorus levels and reproductive phenomena. The following table shows the effects of mineral supplementation on reproductive performance.

Effects of Calcium and Phosphorus Supplementation on Reproductive Performance.

	Lots 1	2	3	4
Mineral supplement	None	Low	Average	High
Heifers per treatment	10	10	10	10
Services per conception[1]	1.5	1.5	2.4	2.3
Heifers never conceiving[2]	2	0	2	3
Embryonic death loss[3]	4[4]	1	0	2
Percent calf crop	60	90	80	50[3]
Birth weight	69	63	65	64

1. Calculated on heifers known to have conceived as detected by rectal palpation.
2. Based on 35- to 40-day rectal palpation and failure to calve. Two heifers in Lot 1 and one in Lot 4 failed to ovulate throughout breeding season.
3. One calf was born dead in this group and is not included in this figure.
4. One heifer resorbed two embryos.

Table 48
Chemical analysis of the experimental ration.

Feedstuff	Protein, %	Calcium, %	Phosphorus, %
Corn gluten meal	43.63	0.05	0.98
Dried molasses	6.25	0.73	0.16
Dicalcium phosphate	0.00	22.33	20.56
Bluestem grass	4.72	0.43	0.09