

**NAME OF TEST:** Pasture fertilization and management, Lufkin

**OBJECTIVES:** To evaluate the efficiency of three fertility regimes each grazed at three intensities in terms of per acre animal gains and average daily gains.

**EXPERIMENTAL PROCEDURE:**

**Location:** East Texas Pasture Investigations Laboratory

**Soil type:** Bibb sandy loam

**Fertilizer treatments:** (1) Pastures A-1, A-2, A-3 and A-4 received 15-60-60 fertilizer in April plus 5/8 ton of lime per acre and 60-0-0 fertilizer in June.

(2) Pastures B-1, B-2, B-3 and B-4 received 100-100-100 fertilizer in April plus 1 1/4 ton lime per acre, 100-0-0 in June and 100-0-0 in August.

(3) Pastures C-1, C-2, C-3 and C-4 received no fertilizer or lime.

**Stocking rates:** Within each fertilizer treatment, three stocking rates were utilized, the actual rate being based on available forage. The average rates ranged from 3/4 animal per acre to 3 1/4 animals per acre.

**Irrigation:** All fertilized pastures were irrigated as necessary to maintain active plant growth. Irrigations were in early July (2 acre inches), early August (2 acre inches) and pastures A-1 and B-1 in late August (2 acre inches).

**Vitamin A:** Fifteen of the experimental animals were given Vitamin A injections ( 2 million units under the skin ) on May 3 and again on June 13. Thirteen similar animals were given no injections. Other treatment and handling of the animals were the same.

**Animals:** Two testor animals (heifers) were placed in each pasture on April 18 and remained on that pasture for the duration of the test. Other animals were added or removed ("put and take" animals) as necessary to maintain the desired grazing intensity.

**Data:** All animals were weighed approximately monthly and gains per acre and daily gains per animal calculated. Samples of forage were harvested from each pasture during each period and the amount of available forage calculated.

**RESULTS:** Total animal gains per acre and average daily gains are shown in Table 1 for each fertilizer treatment and stocking rate combination. The greatest total gain per acre is on the heavily fertilized pasture stocked at the heaviest rate. Moderate fertilization (75-60-60 + lime) stocked at 2+ animals per acre produced the second highest gains. Acre production with stocking rates of 3/4 to 1 1/2 animals per acre was much below that with heavier stocking rates. Average daily gains varied but followed no set pattern. Gains were as good with the heaviest stocking rate as with the lowest with one exception. Rate of gain was lower with the intermediate stocking rate than either the high or low in all cases.

Stocking rates by grazing periods are given in Table 2. The level of available forage for each grazing period is shown in Table 3. Only slightly less forage was available on heavily stocked than on moderately stocked pastures. The level of forage on the two sets of fertilized pastures was essentially the same, but much above that on unfertilized pastures. Vitamin A (Table 4) had very little influence on animal performance.

**DISCUSSION:** All pastures in the test area had been moderately to heavily fertilized for at least six years previous to 1962. Thus, residual fertility might tend to mask effects of treatments in 1962. This would be true especially of the unfertilized pastures which would not necessarily

perform as low fertility pastures. The value of the increased gain per acre with 75-60-60 at the heaviest stocking rate would approximately equal the fertilizer costs. The additional gain with still more fertilizer would not offset the cost of the extra fertilizer. It is doubtful that the lime had any significant influence in 1962 since the sward was composed largely of grasses.

Some of the extra gain with 75-60-60 may have been due to the 4 inches of irrigation water. There is no way to assess the effects of the fertilizer alone. Stocking rate with 75-60-60 was heavier than with no fertilizer but the available forage data with no fertilizer indicates that these pastures were stocked essentially to capacity. Thus, the increased acre gain is not likely due to the heavier stocking rate.

The data on average daily gains is difficult to explain. Normally stocking rate and average daily gains are inversely related if the heaviest rates limit forage availability and therefore opportunity for selective grazing. The available forage data indicate only a slight trend toward reduced forage with increased stocking rates. Perhaps the heaviest rates did not limit intake nor forage quality in 1962. Even this would not explain the reduced rate of gain at the intermediate stocking rate in all cases.

Weight losses were encountered in some pastures in late August and early September. However, these were not as severe as in some previous years and no death losses occurred. Weight gains were recorded for all except one pasture in the final period. Total weight gains of over 400 pounds per acre and average daily gains in excess of one pound are considered very satisfactory.

Additional work is needed to determine if previous ill-thrift problems will again be encountered.

PROJECT: 1075  
WORKERS: E. C. Holt and E. K. Crouch  
DATE: January, 1963

Table 1. Gain per acre and gain per animal on experimental pastures at Lufkin, 1962.

Pasture No.	Fertilizer treatment <sup>1/</sup>	Stocking rate <sup>2/</sup>	Grazing Period						Total
			4/18-5/16	5/17-6/12	6/13-7/16	7/17-8/14	8/15-9/13	9/14-10/31	
Pounds animal gain per acre									
A-1	75-60-60 +	2.13	100	80	108	50	45	56	439
A-2	5/8 ton of	1.56	125	28	15	40	30	-27	211
A-3 & 4	lime per acre	.74	56	26	9	26	19	7	143
B-1	300-100-100 +	2.29	140	78	82	118	-35	99	482
B-2	1 1/4 ton of	1.52	130	50	15	43	-8	58	288
B-3 & 4	lime per acre	.75	58	46	25	34	16	55	234
C-1	0-0-0	1.78	115	93	45	83	-25	57	368
C-2		1.40	85	35	30	33	-15	5	173
C-3 & 4		.74	44	33	11	48	-14	38	160
-----									
			Average daily gain (pounds per animal)						Average
A-1	75-60-60 +	2.13	2.38	1.98	1.58	.70	.60	.46	1.28
A-2	5/8 ton of	1.56	2.98	1.02	.34	.92	.57	-.37	.91
A-3 & 4	lime per acre	.74	3.00	1.30	.34	1.21	.83	.18	1.14
B-1	300-100-100 +	2.29	2.83	1.91	1.21	1.64	-.47	.68	1.30
B-2	1 1/4 ton of	1.52	3.10	1.85	.34	.98	-.17	.60	1.12
B-3 & 4	lime per acre	.75	2.74	2.28	.98	1.55	.72	1.51	1.63
C-1	0-0-0	1.78	2.74	2.28	.66	1.42	-.57	.59	1.19
C-2		1.40	2.02	1.30	.68	.75	-.33	.07	.75
C-3 & 4		.74	2.33	1.60	.44	2.18	-.61	1.05	1.17

<sup>1/</sup> A pastures received 15-60-60 + lime in April and 60-0-0 in June. B pastures received 100-100-100 + lime in April, 100-0-0 in June and 100-0-0 in August.

<sup>2/</sup> Average number of animals per acre.

Table 2. Average number of animals per acre on experimental pastures at various times during the grazing season, Lufkin, 1962.

Pasture No.	Fertilizer treatment <sup>1/</sup>	Grazing Period						Average
		4/18- 5/16	5/17- 6/12	6/13- 7/16	7/17- 8/14	8/15- 9/13	9/13- 10/31	
A-1	75-60-60 +	1.4	1.5	2.0	2.5	2.5	2.5	2.13
A-2	5/8 ton of	1.4	1.0	1.3	1.5	1.8	2.0	1.56
A-3 & 4	lime per acre	.6	.8	.8	.8	.8	.8	.74
B-1	300-100-100 +	1.6	1.5	2.0	2.5	2.5	3.0	2.29
B-2	1 1/4 ton of	1.4	1.0	1.3	1.5	1.5	2.0	1.52
B-3 & 4	lime per acre	.7	.8	.8	.8	.8	.8	.75
C-1	0-0-0	1.4	1.5	2.0	2.0	1.5	2.0	1.78
C-2		1.4	1.0	1.3	1.5	1.5	1.5	1.40
C-3 & 4		.6	.8	.8	.8	.8	.8	.74

<sup>1/</sup> A pastures received 15-60-60 + lime in April and 60-0-0 in June. B pastures received 100-100-100 + lime in April, 100-0-0 in June and 100-0-0 in August.

Table 3. Average amount of available forage in experimental pastures as influenced by fertilization and stocking rate, Lufkin, 1962.

Pasture No.	Fertilizer treatment <sup>1/</sup>	Stocking rate <sup>2/</sup>	Pounds of dry forage per acre						Average
			May	June	July	Aug.	Sept.	Oct.	
A-1	75-60-60 +	2.13	710	810	2430	2190	720	1470	1390
A-2	5/8 ton of	1.56	520	1260	2430	2300	1040	1070	1440
A-3 & 4	lime per acre	.74	1400	1360	2090	1820	1720	1960	1720
B-1	300-100-100 +	2.29	1030	1030	1780	2300	1090	910	1360
B-2	1 1/4 ton of	1.52	1140	1220	2190	1580	1660	1740	1590
B-3 & 4	lime per acre	.75	1280	1260	1750	2560	1590	2720	1860
C-1	0-0-0	1.78	450	800	630	160	30	70	360
C-2		1.40	850	900	1340	260	240	1200	800
C-3 & 4		.74	820	1110	1270	490	800	860	890

<sup>1/</sup> A pastures received 15-60-60 + lime in April and 60-0-0 in June. B pastures received 100-100-100 + lime in April, 100-0-0 in June and 100-0-0 in August.

<sup>2/</sup> Average number of animals per acre.

Table 4. The influence of Vitamin A on average gain per animal per day, Lufkin, 1962.

Treatment	Average daily gains (pounds per animal) per grazing period					
	5/17- 6/12	6/13- 7/16	7/17- 8/14	8/15- 9/13	9/14- 10/31	Season Average
Vitamin A <sup>1/</sup>	1.44	1.05	1.27	-.01	.57	.83
No Vitamin A	1.59	.70	1.25	.14	.46	.76

<sup>1/</sup> 2 million units Vitamin A per animal injected under the skin at each weigh period beginning in May.

Table 5. Soil analyses prior to application of fertilizers in 1962, Lufkin Experimental Pastures.

Pasture No.	pH	O.M. %	P <sub>2</sub> O <sub>5</sub> ppm	K <sub>2</sub> O ppm	CaO ppm	Soluble Salts*
A-1	6.8	1.9	92	96	1204	120
A-2	6.6	2.0	94	138	1316	168
A-3	6.5	2.2	122	106	1204	168
A-4	6.5	1.7	53	138	1162	144
-----						
B-1	6.4	1.6	60	77	1120	144
B-2	6.7	2.1	106	110	1120	144
B-3	6.6	1.6	30	91	966	168
B-4	6.5	1.4	53	77	1022	168
-----						
C-1	6.2	2.4	44	138	1204	216
C-2	6.7	2.1	58	110	1750	240
C-3	6.6	2.0	80	91	1120	168
C-4	6.3	1.9	34	82	924	120

\*PP2M