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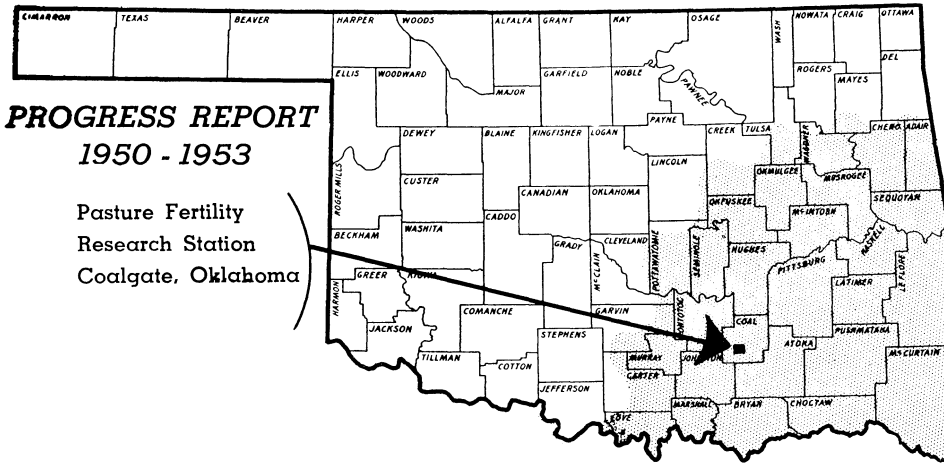
Pasture Grazing Trials

On Various Land Types



PROGRESS REPORT
1950 - 1953

Pasture Fertility
Research Station
Coalgate, Oklahoma

By

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This Bulletin in Brief . . .

This bulletin reports results of grazing trials at the Southeast Oklahoma Pasture Fertility Station near Coalgate, Oklahoma, for the period 1950-1953. Pasture studies there have dealt with beef production on Bermuda grass-legume pastures, Weeping lovegrass-legume pastures, and improved and unimproved native grass pastures.

Bermuda Grass-legume Pastures

Pastures of common Bermuda grass with legumes were established on four land types receiving various soil treatments. Annual average animal gain per acre during the four-year period reported in this bulletin was:

Upland prairie soil:
- Unfertilized, 59 pounds
- Limed, 88 pounds
- Lime and 0-20-0 fertilizer, 124 pounds

Claypan prairie soil:
- Lime and 0-20-0 fertilizer, 113 pounds

Alluvial bottomland soil:
- Limed, 135 pounds
- Lime and 0-20-0 fertilizer, 217 pounds

Permeable shallow upland soil
- Lime and 0-14-7 fertilizer, 94 pounds

Average gains per head during the grazing season were:
- Yearlings, 1950, 198 pounds
- Two-year-olds, 1951, 197 pounds
- Three-year-olds, 1952 (93 day period), 242 pounds

Market grades in general were higher for those animals grazed in fertilized pastures. Yearling steers in 1953 gained an average of 193 pounds during the grazing season.

Animal gains were highest in late spring and early summer, with daily gain per head reduced considerably in late summer and fall months.

Hop clovers have been the dominant legumes in all Bermuda grass pastures at this station. White and Ladino clovers are also present in large amounts in the bottomland pastures during most years. More lespedeza has persisted in the pastures on low fertility upland soil than in the pastures with higher fertility levels. The latter support abundant growth of hop clovers.

Weeping Lovegrass-legume Pastures

Two Weeping lovegrass-legume pastures were established on shallow upland soil. Annual production of beef per acre, as an average during the three-year period 1950-1952 were:

Unfertilized, 52 pounds
Lime and 0-14-7 fertilizer, 112 pounds

Improved vs. Unimproved Native Pasture

An overgrazed 300-acre area of native grass was divided into two 150-acre pastures of similar soil types. One was given no treatment. The other was improved by various treatments. During the four-year period 1949-1952, the unimproved area produced an annual average of 14 calves from 16 cows with average weaning weights of 391 pounds. An improved pasture of equal area and similar land types produced an average of 21.8 calves from 26 cows weighing 421.5 pounds at weaning during that period.

In 1933, yearling cattle grazed on the unimproved pasture, with one animal per five acres, gained an average of 269 pounds per head, and produced 53.9 pounds of beef per acre. On the improved pasture the same age cattle with 3.5 acres per animal gained 257 pounds per head and produced 68.4 pounds of beef per acre.

PASTURE GRAZING TRIALS
On Various Land Types

Pasture Fertility Research Station
Coalgate, Oklahoma
1950-1953

By J. Q. LYND, W. C. ELDER, and ROBERT TOTUSEK
Departments of Agronomy and Animal Husbandry

The two principal objectives of the Pasture Fertility Research Station near Coalgate are to find practical means of attaining productive soil fertility levels on various land types representative of southeastern Oklahoma, and to determine the grazing value of forage produced on improved pastures of adapted sward types. The 220-acre main station consists of nine improved pastures established on different types of land. One mile west of the main station an additional 300-acre area is divided into native grass and improved pastures.

This bulletin reports results on both the main station and the 300-acre pasture area from 1950 through 1953. Experimental results at the main station 1946 through 1949 were reported by Harper, et al, 1950 (1)*.

Many problems concerned with pasture improvement exist in southeastern Oklahoma and within the central Cross Timbers region of the State. These problems primarily involve improvement of pasture production by increasing soil fertility and by growing adapted grasses and legumes. Improving permanent pastures is of particular concern on the thousands of acres of shallow, eroded, overgrazed, and abandoned fields within the area.

Climatic conditions, particularly rainfall and temperatures, are generally favorable for growth of adapted species of desirable forage plants during most years. A grazing season of 180 to 200 days is normal; but in unfavorable years a number of weeks of either severe drouthy or extremely wet weather may occur during this period. This situation requires forage species of both grasses and legumes that are tolerant of these extremes or that can be depended upon to reseed under unfavorable conditions.

* Figures in parenthesis refer to literature cited, page 22.

The soils in this area are generally acid in reaction and low in available phosphorus, calcium, and potassium. Soil fertility levels are usually too low for good crop production, particularly on the uplands. Because of the low fertility levels and cultivation abuse, most of these soils are also low in soil nitrogen and organic matter content. Much of the land previously used for production of cultivated crops has been abandoned, primarily because the low soil fertility level will not produce cash crops profitably. Therefore improving soil fertility levels must be the basis for pasture improvement.

About the Coalgate Pasture Fertility Station . . .

The Pasture Fertility Station is located six miles northeast of Coalgate in the west-central part of Coal county. The types of land on the main station are typical of several million acres used for pastures in that part of the State. Half of this farm was originally covered with scrub blackjack and post oak forest developed on light textured, shallow, well-drained soils. Most of this area had been cleared and used for cultivated crops but was abandoned from cultivation for many years before the station was established. The other half of the station was prairie land that had been cultivated for some 60 years prior to being abandoned. An area of alluvial bottom land that had never been cleared separated the prairie land from the forested area.

The soil types were mapped in detail within the area and nine pastures were delineated on the basis of these soil types. These pastures, their soil characteristics, size, and fertilizer treatment are presented in Table 1.

Description of Pastures

Pastures A, B, C, D, E, and F were established in 1945, with two tons of limestone applied to all pastures except A. Local common-type Bermuda grass roots were planted in May and June of that year. Ten pounds of ryegrass and two pounds of legume mixture per acre were planted in September on all pastures, and 150 pounds of 20 per cent superphosphate drilled in 14-inch rows in pastures C, D, and F. This superphosphate application was repeated in 1948 and 1951.

The legume mixture contained Big and Little Hop clovers, White Dutch, Ladino, Persian, Alsike, Black Medic, Subterranean, and a

miscellaneous group of Birdsfoot Trefoil, Button and Burr clovers. Ten pounds of Korean lespedeza per acre were broadcast in March, 1946; 15 pounds of Korean-Kobe lespedeza mixture was drilled in all of these pastures in 1948.

Pasture G was planted with the same strain of common Bermuda grass and pastures H and I to Weeping Lovegrass in 1946. One and one-half tons per acre of limestone were disked into pastures G and I with 200 pounds per acre of 0-14-7. The same legume mixture as used in the other pastures was also seeded in pastures G, H, and I. The fertilizer treatment of 200 pounds per acre of 0-14-7 was repeated in pastures G and I in 1949 and 1951.

Cattle Gains from Pastures . . .

CATTLE USED IN THE TESTS

Two-year-old Hereford steers were used in 1946 as experimental animals. In 1947, yearling steers were started on the pastures and kept on the grazing experiment until sold as three-year-olds in 1949. Another herd of yearlings was started on the grazing experiments in 1950 and sold as three-year-olds in 1952. Two-year-old steers were used in 1949 and 1952 to complete the grazing season on these pastures after the three-year-old animals were sold in July of those years. Yearling steers were grazed in the experimental pastures in 1953.

BERMUDA GRASS-LEGUME PASTURES

Gain per acre

The influence of soil fertility treatment on animal gain per acre of common Bermuda grass-legume pastures is shown in Table 2.

Pastures A, B and C are located on Dennis silt loam, a slowly permeable upland prairie soil. Pasture A received no fertility treatment and produced an average of 58.5 pounds animal gain per acre during the four grazing seasons 1950 through 1953. Some Hop clovers and lespedeza were present in this pasture during most years. Pasture B, receiving only two tons of limestone per acre in 1945, produced an average of 88.3 pounds of beef per acre over the same experimental period and supports a greater amount of the Hop clovers and less lespedeza than Pasture A.

Pasture C, receiving the same limestone treatment as Pasture B plus superphosphate (20 per cent P205) at the rate of 150 pounds every

three years has produced an average of 123.5 pounds of beef per acre. Pasture C supports an abundant growth of the Hop clovers and some white clover. The lespedezas have been unable to compete with the heavy spring growth of Hop clover in this pasture. These beef production figures for the years 1950-1953 represent the mean of all steers grazed in these pastures and are slightly below gains produced for the total eight years 1946-1953 of these grazing trials (3).

Pasture E and F located on bottom land soil, Verdigris silt loam, have maintained good growth of Hop, White, and Ladino clovers during most years. Pasture E, receiving the same fertility treatment as Pasture B, has produced an average 134.8 pounds beef per acre, an average of 56.6 pounds more than B Pasture, as a result of more favorable soil characteristics. Pasture F, receiving the same fertility treatment as Pasture C, has produced an average of 217.3 pounds of beef per acre. This was 93.8 pounds per acre more than Pasture C during the same period as a result of the more favorable soil conditions in Pasture F.

Characteristics of soil types have been the principal influence on productivity of the various pastures receiving the same fertility treatment. Stephens (6) presents ten years' data on similar experiments in Louisiana emphasizing the necessity for delineation of soil types having different productive capacities for supportng various pasture swards.

Pasture D is located on a very slowly permeable claypan prairie soil and although this pasture supports good growth of the Hop, White, and Persian clovers during the spring months, the pasture is adversely affected by very wet and drouthy periods during the growing season. This pasture has produced an annual average of 113.3 pounds of beef per acre during the four years reported here.

Bermuda grass has not formed a dense sod on the shallow, light textured soil, Darnell sandy loam of pasture G. The Hop clovers and lespedezas are the prevalent legumes in that pasture. This pasture has produced 94.3 pounds of beef per acre—less than the fertilized pastures.

Gains per head

The animal age, size, and previous winter gain or loss have been related to the gains per head (Table 3). The larger animals, in general, made the highest gains as individuals. The high gains made by three-year-old steers in the months of April, May, and June in 1952, illustrate the ability of these larger animals to better utilize forage from these

types of pastures. Previous winter gain or loss influenced the amount of gain per head during the following grazing season. Mott, et al. (4), have shown that the previous winter performance must be considered when evaluating animal grazing performance on small experimental pastures.

Internal parasites were prevalent in the experimental herd during 1953. However, gains per animal were similar to those of comparable animals in age and weight in previous years' grazing experiments at this station. The problem of internal parasites is common on intensively grazed experimental pastures as reported in Indiana (4) and Arkansas (5).

Seasonal Gains and Losses

Monthly gains per acre and animal gain per day for each pasture are presented in Tables 4 and 5, respectively. In general, these data indicate that the largest gains are made during the month of April and May and early June when Hop clover is making its greatest growth.

Spring seasons in 1950 and 1951 did not produce sufficient forage to allow pasturing before May 1. The pastures that supported heavy Hop clover growth were not favorable for lespedeza, which must begin its growth during spring months. The low fertility and unfertilized pastures did not receive the benefit of these large spring gains from clover growth, but they maintained the rate of gain through the summer months, primarily because of the greater lespedeza growth.

September and October are normally drouthy months and are not favorable for forage growth and pasture gains. The large gains produced during the earlier part of the season on bottomland Pastures E and F declined sharply in the late summer and fall months on these pastures. Pastures on the upland prairie soils produced more uniform rates of gain throughout the season than did the bottomland pastures. The total pounds of beef per acre is less, however, on these upland soils. Pasture D, located on the claypan soil, was affected earlier than other soil types during these fall drouths. None of the pastures was grazed during October during two years of this reported period, 1952 and 1953. Steers were also removed from Pasture D during September of 1952 because of the lack of forage. Pasture G is located principally on shallow, light-textured Darnell soil having a low moisture holding capacity. The dry fall months lower the amount and quality of forage available and adversely affect animal gains.

Winter Rations

Wintering rations of the experimental herds are presented in Table 6. Animals were fed prairie hay and oil seed cake at levels commonly used for wintering cattle prior to summer grazing. The weight gains and losses of these animals were normal for this type ration with steer calves gaining about one-half pound per day, long yearlings holding late fall weights, and long two-year-olds losing a fraction of a pound per day.

Market Grade of Steers

Experimental animals were alloted to pastures as yearlings and were grazed in these same pastures as two- and three-year-olds. Animal gains and market grades of these permanently assigned animals reflect the influence of land type and soil fertility treatment on pasture production and animal performance, as shown in Table 7. The gains and market grade of these animals are similar to those reported by Harper, et al (1) on the previous group of experimental animals grazed only in permanently assigned pastures. These data illustrate the relationships summarized by Lundell and Laws (2) in Texas showing high quality forage production related to soil fertility and beef cattle production.

WEEPING LOVEGRASS-LEGUME PASTURES

Beef production on the Weeping lovegrass-legume pastures, including monthly and daily gains per acre, are presented in Table 8. Beef production on the unfertilized Pasture H, 52 pounds per acre, was about half that on Pasture I, 112.3 pounds per acre. Pasture I received both lime and low rates of 0-14-7 fertilizer. Hop clovers and annual lespedezas provided large amounts of high protein forage during most grazing seasons in Pasture I as a result ot this soil fertilization. An old planting of Bermuda grass in the west half of these two pastures has taken over much of that portion of these fields during these grazing trials.

The highest gains per day were made in April and May when the Hop clovers were at their best. Weeping lovegrass also produces palatable forage during these months. The fertilized Pasture I produced good lespedeza growth during July, August, and September. Lower animal gains and frequent weight losses in both pastures during October were due to the amount and quality of forage available at that time. Forage production is limited during late summer and fall months on

the shallow, light textured soils on which these pastures were located. Forage production on these soil types, Darnell and Collinsville sandy loam, is more seriously affected during periods of low rainfall because of low moisture holding capacity, and animal weight loss usually occurs during such periods.

The stand of Weeping lovegrass in these pastures was being lost during these grazing experiments and common Bermuda grass occurring in these pastures from an old planting gave much competition to the lovegrass.

Steers grazed in the fertilized Pasture I were appraised as slaughter animals at $27.00 per cwt. Animals grazed in the unfertilized Pasture H were appraised as feeder animals at $24.00 per cwt. Steer gain and market grade of these experimental animals are shown in Table 9.

NATIVE GRASS VS. IMPROVED PASTURES

A 300-acre experimental area was selected in 1948 to find the value of pasture improvement on overgrazed native grassland. This area was divided into two 150-acre pastures. Each contains about 50 acres of land too steep or stony to cultivate, approximately 15 acres of bottomland, and 85 acres of tillable upland.

The bottomland in the improved pasture was cleared of timber and planted to a local strain of common Bermuda grass plus Big Hop and White clovers. Forty-six acres of upland were cleared of persimmons, disked, and fertilized with 200 pounds of 0-20-0 per acre. The area was then planted to a mixture of Kobe and Korean lespedeza at a rate of 20 pounds per acre drilled in 14-inch rows. The lespedeza mixtures were replanted with the same rate of phosphate in 1953. About 38 acres of tillable upland in the improved pasture have been plowed and planted to rye and vetch each year to furnish some winter and early spring pasture.

Cow-calf Production

These two pastures were used to support cow-calf herds from 1949 through 1952. The pasture carrying capacity, number of calves produced, and calf weights at nine months were used as measures of pasture productivity.

A stocking rate of one cow and her calf for ten acres of unimproved pasture was used at the start of grazing trials in 1949. On the improved pasture, the rate was one cow and calf for six acres. The numbers of

animals were increased on both pastures in 1951. As a result of the dry weather in 1951 and 1952 the carrying capacity of the pastures decreased. Four years' data from this experiment are summerized in Table 10.

The larger number of calves produced on the improved side had higher weaning weights during the first three years of the experiment. There was less difference between the weaning weights of calves in both pastures as the experiment continued. In 1952, the weaning weights were approximately the same, although more calves were raised in the improved pasture. On the unimproved native grass pasture the four-year-average was 14 calves from 16 cows with average weaning weights of 391 pounds. The improved pasture produced an average of 21.8 calves from 26 cows weighing 421.5 pounds at weaning during that period.

Yearling Gains

In 1953, the beef production of these pastures was measured with yearling Hereford catle. The stocking rate was one animal per five acres on the unimproved pasture and one animal per 3½ acres on the improved side. Average gains per head and per acre are presented in Table 11.

Nine heifers and 31 steers were grazed in the improved pasture. These yearling cattle had an average initial weight of 376 pounds and had an average per head gain of 257 pounds for the grazing season. Six heifers and 24 steers were grazed in the unimproved native grass pasture. They had an initial weight of 355 pounds and had an average per head gain of 269 pounds for the grazing season. The gains per acre were slightly higher for the improved pasture, 68.4 pounds, as compared to 53.9 pounds on the unimproved native grass pasture.

APPENDIX: RAINFALL DATA

The amount and distribution of rainfall at the Southeast Oklahoma Pasture Fertility Station during the years of grazing trials, 1946 through 1953, are presented in Appendix Table 1. These data indicate an eight-year average of 39.41 inches of rainfall per year during this period. One year received less than thirty inches (1952 with 25.23 inches). The year having the highest rainfall was 1946 with 47.83 inches recorded.

Although there was no consistent pattern of precipitation distribution during this eight-year period, there are general trends which are indicative of rainfall probabilities in this portion of the state.

The late fall and winter months, in general, received low amounts of precipitation. October received less than one inch of rainfall in three of the eight years; November had less than one inch in four years during this period; December received less than one inch in two of the eight years and January received less than one inch in five years during the period 1946-1953. However, November in 1946 received 10.33 inches and precipitation equivalent in rainfall for December that same year was 6.79 inches.

The spring and early summer months are rather dependable in furnishing adequate rainfall for crop growth. In only one year of the eight-year period did March (1950) and April (1948) receive less than one inch of rainfall. During two years of this periods, April recevied over six inches rainfall. May received over six inches during four years of the eight.

Summer rainfall was erratic. June, 1951, received 11.9 inches of rainfall. July, 1950, received 10.6 inches, and 13.84 inches fell during that month in 1953. However, July received less than one inch of rainfall during two of the eight years. In five of the eight years August received less than two inches of rainfall, but in 1950, 6.06 inches of rain fell in that month.

These data reflect the basis for the leached and eroded condition of soils typical for this region. Frequent periods of high and intensive rainfall are usually an annual occurrence. The frequent drought periods during the growing season require adapted forage species tolerant of extreme fluctuations in soil moisture. Spring rainfall is usually adequate for good forage growth with summer and fall moisture conditions frequently limiting pasture production during that period.

LAND TYPE AND PASTURE TREATMENT

TABLE 1.—Land type, size, and soil fertility treatment of pastures.

Land Type	Pasture	Acres	Soil Fertility Treatment
Common Bermuda Grass-Legume Pastures			
Slowly permeable upland prairie *(Dennis silt loam)*	A	18.16	No treatment.
	B	18.16	Lime, 2 tons per acre, 1945.
	C	18.16	Lime, 2 tons per acre, 1945; 150 lbs. 0-20-0 per acre in 14″ rows 1945, 1948, and 1951.
Very slowly permeable claypan prairie soil *(Parsons silt loam)*	D	7.45	Lime, 2 tons per acre, 1945; 150 lbs. 0-20-0 per acre in 14″ rows 1945, 1948, and 1951.
Alluvial bottom land *(Verdigris silt loam)*	E	9.48	Lime, 2 tons per acre, 1945.
	F	9.48	Lime, 2 tons per acre, 1945; 150 lbs. 0-20-0 per acre in 14″ rows 1945, 1948, and 1951.
Permeable shallow forested upland (principally *Darnell sandy loam*)	G	23.56	Lime, 1½ tons per acre, 1946; 200 lbs. 0-14-7 per acre in 14″ rows 1946, 1949, and 1951.
Weeping Lovegrass-Legume Pastures			
Permeable shallow forested upland *(Darnell and Collinsville sandy loams)*	H	12.32	No treatment.
	I	12.40	Lime, 1½ tons per acre, 1946; 200 lbs. 0-14-7 per acre in 14″ rows 1946, 1949, and 1951.

GAIN PER ACRE

Table 2—Animal gain per acre, common bermuda grass-legume pastures on four land types receiving various soil fertility treatments, 1950-1953.

Land Type and Pasture Fertility Treatment*	Animal Gain (pounds per acre)				
	1950	1951	1952	1953	Average
Upland Prairie					
A: No treatment	66	54	61	53	59
B: Lime	87	92	91	83	88
C: Lime; 0-20-0	103	118	149	124	124
Claypan Prairie					
D: Lime; 0-20-0	61	80	146	166	113
Bottomland					
E: Lime	153	114	153	119	135
F: Lime; 0-20-0	204	189	267	209	217
Shallow Upland					
G: Lime; 0-14-7	104	84	112	77	94

* See Table 1 for details of land type and soil fertility treatment.

GAIN PER HEAD

TABLE 3—Summer gain per head of yearlings, two-year-old and three-year-old steers on common bermuda grass-legume pastures, 1950-1953.*

Grazing Period	Age	Previous Winter Gain	Initial Weight	Summer gain per head, by pasture (lbs.) A	B	C	D	E	F	G	Gain Per Head
Apr. 17-Nov. 1, 1950 (198 days)	Yearling	64	546	197	205	178	103	225	177	232	198
May 1-Nov. 1, 1951 (184 days)	Two-year-olds	16	755	195	237	213	148	179	179	204	197
Apr. 8-July 10, 1952 (93 days)	Three-year-olds	—29	923	194	237	259	256	205	281	244	242
Apr. 10-Oct. 1, 1953 (174 days)	Yearlings	56	424	192	214	183	282	158	175	150	193

* See Table 1 for land type and soil fertility treatment.

MONTHLY GAINS PER ACRE

TABLE 4.—Average gains per acre by month, bermuda grass-legume pastures on four land types receiving various soil fertility treatments, 1950-1953.

Land Type and Pasture Fertility Treatment*	Animal Gain (pounds per acre) April	May	June	July	August	Sept.	Oct.
Upland Prairie							
A: No treatment	12.1	17.3	16.3	3.8	8.4	4.0	2.0
B: Lime	14.2	29.8	23.2	3.8	10.0	9.4	6.9
C: Lime; 0-20-0	36.3	46.0	32.8	4.5	11.1	4.0	5.6
Claypan Prairie							
D: Lime; 0-20-0	42.8	42.9	26.4	6.3	7.1	7.0	2.5
Bottomland							
E: Lime	33.7	54.9	32.9	17.3	12.8	7.1	9.9
F: Lime; 0-20-0	80.4	81.0	54.2	26.3	21.1	12.0	6.3
Shallow Upland							
G: Lime; 0-14-7	23.9	34.2	23.3	5.5	10.3	7.0	- 1.3

* See Table 1 for details of land type and soil fertility treatment. Actual days pastured of all aged steers used as basis in computing these average figures.

DAILY GAIN BY MONTH

TABLE 5.—Average daily gain by month, bermuda grass-legume pastures on four land types receiving various soil fertility treatments, 1950-1953.

Land type and pasture fertility treatment*	Animal Gain (pounds per acre)						
	April	May	June	July	August	Sept.	Oct.
Upland Prairie							
A: No treatment	2.1	1.9	1.8	.9	1.0	.5	.4
B: Lime	3.3	2.3	2.0	.6	.9	.8	.6
C: Lime; 0-20-0	2.8	2.3	2.0	.7	.8	.3	.3
Claypan Prairie							
D: Lime; 0-20-0	3.6	2.4	1.6	.5	.8	.3	.2
Bottomland							
E: Lime	2.3	2.4	1.7	2.8	.7	.6	.8
F: Lime; 0-20-0	3.5	2.3	1.8	2.9	.7	.4	.6
Shallow Upland							
G: Lime; 0-14-7	2.6	2.2	1.7	.8	.8	.6	.2

* See Table 1 for details of land type and soil fertility treatment. Actual days pastured of all aged steers used as basis in computing these average figures.

WINTERING RATIONS

Table 6.—Wintering rations and average daily weight gain or loss of experimental steers, 1949-1953.

	Days Wintered	Pounds fed daily per steer			Daily Av. Gain or loss (lbs.)
		Prairie Hay	Cotton Seed Meal	Soybean Meal	
Steer calves, 1949-50	135	9.0	1.33		.61
Long yearlings, 1950-51	161	11.9		1.50	.09
Long Twos, 1951-52	161	16.2	1.50		-.16
Steer calves, 1952-53	151	8.9		.98	.48

STEER GAIN AND MARKET GRADE

TABLE 7.—Effect of land type and fertility treatment on gain and market grade of experimental steers on common bermuda grass-legume pastures, April 17, 1950—July 10, 1952.

Land Type and Pasture Fertility Treatment*	No. permanent steers	Weights (lbs. per head)			Grade and Value of Steers			
		Initial	Final	Gain	Feeder		Slaughter	
					No. grading feeder	Appraised value per cwt.	No. grading slaughter	Appraised value per cwt.
Upland Prairie								
A: No treatment	5	563	1130	567	1	$23.00	4	$26.00
B: Lime	6	551	1173	622	3	23.00	3	27.00
C: Lime; 0-20-0	9	554	1204	650			9	28.00
Claypan Prairie								
D: Lime; 0-20-0	4	551	1104	553			4	27.00
Bottomland								
E: Lime	6	529	1151	622	1	23.00	5	26.50
F: Lime; 0-20-0	10	531	1156	625	2	25.00	8	27.50
Shallow Upland								
G: Lime; 0-14-7	10	548	1205	657	2	25.00	8	28.50

* See Table 1 for details of land type and soil fertility treatment.

WEEPING LOVEGRASS-LEGUME BEEF PRODUCTION

TABLE 8.—Effect of lime and fertilizer on animal gains, weeping lovegrass-legume pastures. Darnell and Collinsville sandy loams, 1950-1952.*

Gain per acre, by years.	Pasture H (12.32 acres) No treatment	Pasture I (12.40 acres) Lime 0-14-7
1950	51	132
1951	51	90
1952	54	115
Av.	52	112
Gain per acre, by months**		
April	3.1	14.4
May	16.3	44.7
June	15.2	25.3
July	2.6	4.8
August	5.9	10.3
September	8.1	11.4
October	.5	10.9
Daily gain per head**		
April	.6	1.6
May	2.0	2.9
June	2.0	1.8
July	.6	.7
August	.8	.9
September	1.1	1.0
October	0.0	.8

* See Table I for details of land type and soil fertility treatment.
** Actual days pastured for steers of all ages were used as basis for computing these average figures.

STEER GAIN AND MARKET GRADE

TABLE 9.—Gain and market grade of experimental steers on Weeping lovegrass-legume pastures, Darnell and Collinsville sandy loams, April 17, 1950—July 10, 1952.*

	Pasture H (12.32 acres) No treatment	Pasture I (12.40 acres) Lime 0-14-7
No. permanent steers	3	5
Av. initial wt. Apr. 17, 1950	550	563
Av. final wt. July 10, 1952	1191	1324
Av. gain (lbs.) Apr. 17, 1950—July 10, 1950	642	761
No. steers grading feeder	3	
Av. appraised value (cwt.)	$24.00	
No. steers grading slaughter		5
Av. appraised value (cwt.)		$27.00

* See Table I for details of land type and soil fertility treatment.

COW-CALF PRODUCTION, NATIVE GRASS AND IMPROVED PASTURES

TABLE 10.—Number of calves, average calf weight, and total pounds of beef produced with calves in native grass and improved 150 acre pastures of similar land types, 1949-1952.

	1949	1950	1951	1952	Av.
		Improved Pastures			
Stocking rate					
Cows	25	25	28	26	26
Calves	20	20	26*	21**	21.8
Calf weight at weaning (pounds)	413	478	398	397	421.5
Total calf weight (pounds)	8,260	9,560	10,340	7,940	9,025
		Native Grass Pastures			
Stocking rate					
Cows	15	15	18	16	16
Calves	12	12	18	14	14
Calf weight at weaning (pounds)	326	452	388	398	391
Total calf weight (pounds)	4,950	5,424	6,690	5,535	5,649.8

* Two calves died.
** One calf died.

YEARLINGS ON NATIVE AND IMPROVED PASTURE

TABLE 11.—Average weights and gains of yearling cattle on native grass and improved 150-acre pastures of similar land types, 1953.
(Pounds)

	Native Grass Pasture (6 heifers, 24 steers) 5A. per head		Improved Pastures (9 heifers, 31 steers) 3.75 A. per head	
	Average per Head	Gain	Average per Head	Gain
April 4 (initial)	355	---	376	---
June 18	530	175	553	177
August 9	557	27	548	- 5
October 17 (final)	624	67	633	85
Average for season				
Per head		269		257
Per acre		53.9		68.4

RAINFALL DATA

Appendix 1.—Table 12.—Rainfall Data, Southeast Oklahoma Pasture Fertility Experiment Station, Coalgate, Oklahoma, 1946-1953.

(Inches of Precipitation)

	1946	1947	1948	1949	1950	1951	1952	1953	Monthly Average
Jan.	2.82	.33	.65	5.19	3.74	.91	.73	.59	1.87
Feb.	5.39	.33	4.28	3.07	2.23	2.81	1.17	1.35	2.58
March	2.92	1.81	2.13	3.75	.20	1.28	3.97	5.82	2.74
April	3.43	7.26	.78	6.39	3.64	2.33	5.04	7.99	4.61
May	6.38	8.67	7.01	5.84	7.25	2.57	3.72	3.45	5.61
June	3.73	3.97	5.36	5.39	2.80	11.90	1.05	1.32	4.44
July	.22	3.22	4.42	1.60	10.60	2.68	.76	13.84	5.52
August	2.31	1.57	1.88	2.13	6.06	.95	1.32	1.99	2.28
Sept.	3.03	2.12	1.46	4.95	5.56	5.15	.97	3.25	3.31
Oct.	.48	1.16	2.48	4.67	.17	5.03	.35	1.98	2.04
Nov.	10.33	2.96	.24	0.00	.37	1.81	4.82	.89	2.68
Dec.	6.79	5.44	1.62	3.42	.04	.33	1.33	1.81	2.60
Total	47.83	38.84	32.31	46.40	42.66	37.75	25.23	44.28	39.41

LITERATURE CITED

1. Harper, H. J., W. C. Elder, and B. Ross. "Progress Report, 1945-1949, Southeast Oklahoma Pasture Fertility Research Station." *Okla. Agri. Expt. Sta. Bul.* B-348. May, 1950.

2. Lundell, C. L. and W. Derby Laws. "Soil fertility in relation to the production of beef cattle." Bul. No. 2, *Hoblitzelle Agri. Lab., Texas Research Foundation.* January, 1954.

3. Lynd, J. Q., W. C. Elder and Robert Totusek. "Progress report of grazing trials." *Southeast Oklahoma Pasture-Soil Fertility Experiment Station. 1945-1953. Mimeo.* Cir. MT 263. June, 1954.

4. Mott, G. O., R. E. Smith, W. M. McVey and W. M. Beeson. "Grazing trials with beef cattle at Miller-Purdue Memorial Farm, *Purdue Univ. Agri. Expt. Sta. Bul.* 581. July, 1952. (rev. May, 1953).

5. Nelson, Martin. "Permanent pasture studies," *Ark. Agri. Expt. Sta. Bul.* 407. April, 1941.

6. Stephens, J. L. "Pastures for the coastal plain of Georgia." *Ga. Coastal Plain Expt. Sta. Bul.* 27. June, 1942 (rev. June 1, 1952).