Mimeographed Circular M-269 April, 1955

FORAGE CROPS

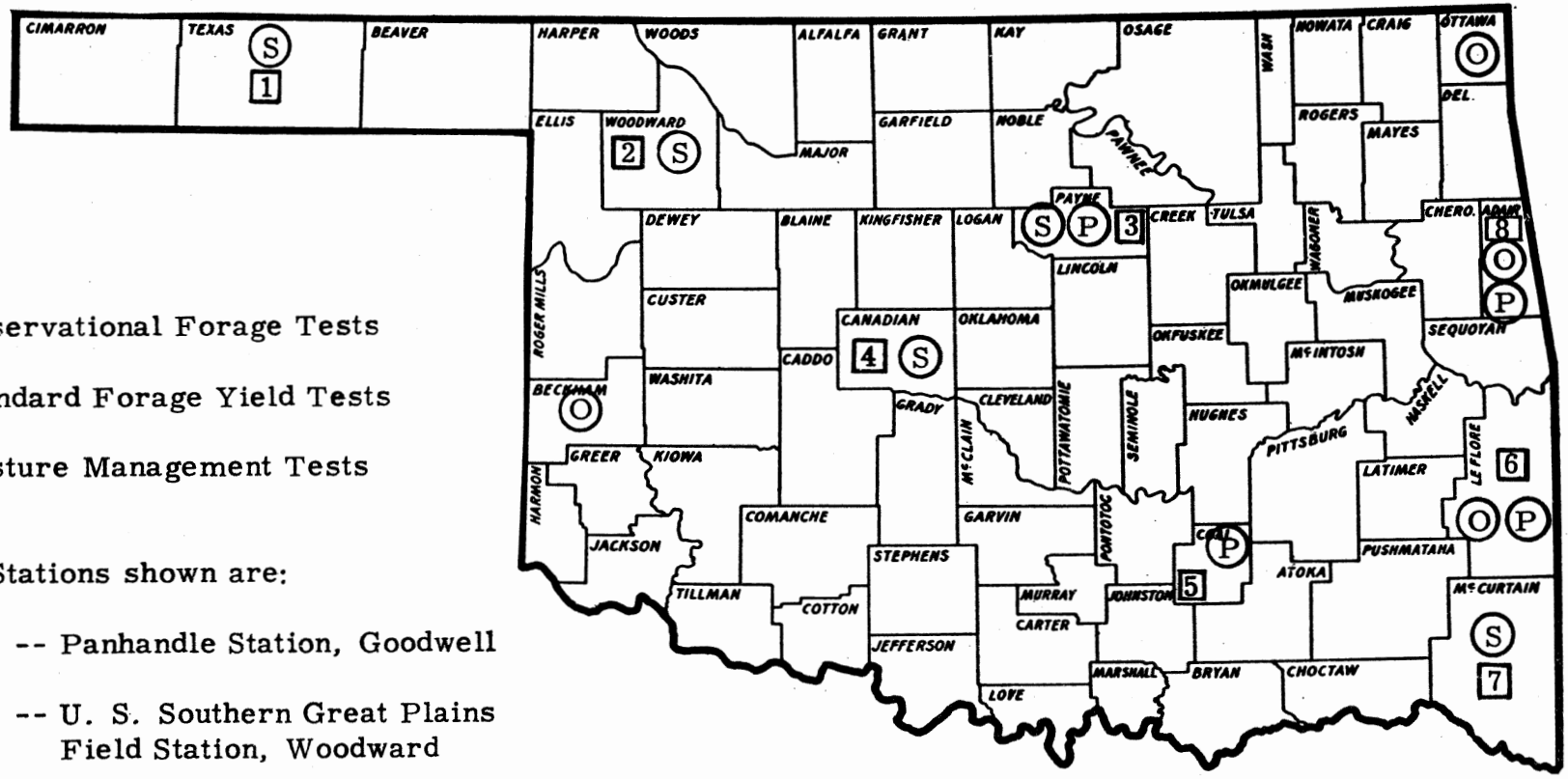
EVALUATION AND MANAGEMENT STUDIES

Progress Report, 1954

§
§ §
§

Agricultural Experiment Station
DIVISION OF AGRICULTURE
Oklahoma A. & M. College
Stillwater

CONTENTS



O -- Observational Forage Tests

S -- Standard Forage Yield Tests

P -- Pasture Management Tests

Special Stations shown are:

1 -- Panhandle Station, Goodwell

2 -- U. S. Southern Great Plains Field Station, Woodward

3 -- Main Station, Stillwater (including Perkins Farm 9 miles south)

4 -- Ft. Reno Experiment Station, El Reno

5 -- Pasture Fertility Station, Coalgate

6 -- Soil and Pasture Station, Heavener

7 -- Kiamichi Field Station, Idabel

8 -- Eastern Oklahoma Field Station, Stilwell

(PART I)

PASTURE PLANT ADAPTATION TESTS, 1954

By Wayne W. Huffine

Severe drought conditions throughout Oklahoma caused considerable reduction in forage yields and in some instances complete loss of the test plots. The unusually hot, dry weather was not entirely without benefit as it did provide a critical test for heat and drought tolerance of the forage grasses and legumes.

The forage crop testing program was established to determine the areas of adaptation and relative yields of the many forage grasses and legumes. This is to be accomplished by sampling each of the pasture and natural vegetation regions of Oklahoma as shown in Forage Crops Leaflet No. 3

In addition to previously established plots, as shown in table I of Mimeographed Circular M-261, individual strains of 142 forage grasses or legumes were planted in the spring or fall of 1954 at one or more of seven test locations. These locations and the strains planted at each are shown in this publication. Performance data are given for two or three year periods where available.

DESCRIPTION OF ADAPTATION TESTS

All available strains of forage grasses and legumes, and new ones as they become available, are being evaluated on the basis of forage yield, chemical analysis, seedling vigor, recovery after clipping, cold and heat tolerance, and disease and insect resistance.

Acknowledgments ---

All chemical analyses were made by Dr. V. G. Heller, Professor of Agricultural Chemistry Research, Oklahoma A. and M. College.

Data on forage yields of Sudan are from Mr. C. E. Denman, Assistant Professor of Agronomy, Oklahoma A. and M. College.

Two types of tests are in use at the present time: (1) Standard Forage Yield Tests; and (2) Observational Tests. The observational tests will be replaced by standard forage yield tests as rapidly as facilities permit.

Data obtained from observational tests include vigor, disease and insect damage, and general adaptation in each region. The tests are usually 3 x 20 foot plots replicated only once.

The standard forage yield test for each strain consists of a minimum of four replications, and usually each plot is 5 x 20 feet.

Locations; and Strains Included

Locations of the tests planted in 1953 and 1954, and the varieties or strains included in each, are shown in Table I and by the map on the "Contents" pages. The tests at Goodwell and El Reno are irrigated.

1954 Results

Tables II through VII show results of previously established forage crop variety trials as well as those annuals established this year.

References

Additional information and data on test locations, forage yields and protein content as obtained at the various locations are given in the 1953 Annual Report of Progress in Forage Crops Evaluation and Management Studies, Mimeographed Circular M-261, Part I, pages 2 through 14.

Data on the effect of plant spacing on seed yield of the Greenleaf Variety of Sudan are included in Mimeographed Circular M-261, Part I, page 12.

This Annual Report of Progress (mimeographed) is available upon request to research workers in forage crops, and others having similar interests, so long as the limited supply lasts.

TABLE I. -- Forage Crops Strains and Varieties Planted in the Fall of 1953 and 1954 at Eight Forage Crop Testing Locations.

Variety	El Reno*	Goodwell*	Heavener	Idabel	Miami	Perkins	Stilwell	Woodward
Alfalfa								
Hay Types								
Oklahoma Common	3/1		3		3	4	4	
Socheville	3		3		3	4	4	
Ranger	3		3		3	4	4	
Narragansett	3		3		3	4	4	
Sazovakir	3	3	3		3	4	4	3
Nevada Syn. A.	3		3		3	4	4	
Vernal (Wisc. Syn. G.)	3		3		3	4	4	
Buffalo	3		3		3	4	4	
Talent	3		3		3	4	4	
Du Puits	3		3		3	4	4	
Williamsburg	3		3		3	4	4	
Atlantic	3		3		3	4	4	
W-268	3		3		3	4	4	
Uruguay # 10						4	4	
Italian						4	4	
Caliverde						4	4	
Pasture Types								
Stafford	3	3	3		3	4	4	
Turkish Wild	3	3	3		3	4		
Nomad	3	3	3		3	4		
A-224	3		3		3	4		
Sevelra	3	3	3		3	4		
Ladak	3	3	3		3	4	4	
Rhizoma	3		3		3	4		
A-169						4		

* Irrigated forage tests.

/1 Figure 3 represents plots which were planted and successfully established in 1953
/2 Figure 4 represents plots which were planted or replanted in 1954.

TABLE I. -- Continued.

Variety	El Reno*	Goodwell*	Heavener	Idabel	Miami	Perkins	Stilwell	Woodward
Alsike Clover			3		3	4	4	
Astragalus cicer	3		3		3	4	4	
Big Hop Clover						4	4	
Birdsfoot Trefoil								
Iowa Empire			4	4	4	4	4	
Cascade			4	4	4	4	4	
Italian Broadleaf			4	4	4	4	4	
Viking			4	4	4	4	4	
Mansfield			4	4	4	4	4	
Granger			4	4	4	4	4	
Empire			4	4	4	4	4	
Blue Panic			4			4	4	
Buffel Grass			4			4	4	
Bromegrass								
Martin		3	3		3	4	4	3
Lincoln	3	3	3	3	3	4	4	3
Elsberry	3	3	3	3	3	4	4	3
Manchar		3	3	3	3	4	4	3
Southland (Okla. Syn.)	3	3	3	3	3	4	4	3
Homesteader		3	3		3	4	4	3
Mandan 404		3	3		3	4	4	3
Canadian Commercial		3	3		3	4	4	3
Fischer	3	3	3	3	3	4	4	3
Lyon	3	3	3	3	3	4	4	3
Lancaster	3	3	3	3	3	4	4	3
Achenbach	3		3	3	3		4	
Woodward	3							
Crimson Clover								
Auburn Reseeding			3	3	3	4	4	
Autauga			3	3	3	4	4	
Talladega			3	3	3	4	4	
Dixie			3	3	3	4	4	
Mississippi Selection			3	3	3	4	4	

TABLE I. -- Continued.

Variety	El Reno	Goodwell	Heavener	Idabel	Miami	Perkins	Stilwell	Woodward
Common			3	3	3	4	4	
Fescue								
Kentucky 31	3		3	3	3	3	4	
4-36	3		3	3	3	3	4	
Goar	3		3	3	3	3	4	
Alta	3		3	3	3	3	4	
19 G1-25	3		3	3	3	3	4	
Alta #144	3		3	3	3	3	4	
Giant Red Suckling Clover			4			4	4	
Lespedeza								
Common			4	4	4	4	4	
Kobe			4	4	4	4	4	
Iowa 6			4	4	4	4	4	
Korean			4	4	4	4	4	
Climax			4	4	4	4	4	
Rowan			4	4	4	4	4	
Millet								
Starr		4	4	4	4	4	4	
Hybrid No. 1		4	4	4	4	4	4	
Common		4	4	4	4	4	4	
Texas		4	4	4	4	4	4	
Orchardgrass								
Commercial	3		3	3	3	3		
ADEFA	3		3	3	3	3		
Oregon 233	3		3	3	3	3		
M2-11142-50	3		3	3	3	3		
Beltsville Strain	3		3	3	3	3		
No. 88	3		3	3	3	3	4	
Palestine	3		3		3	3	4	
H-2	3		3	3	3	3	4	
F-52	3		3	3	3	3	4	
Trogdon	3		3	3	3	3	4	
Akaroa	3		3	3	3	3	4	
Persian Clover			4			4	4	
Reed Canary Grass	3	3	3	3	3	3	4	

TABLE I. --Continued.

Variety	El Reno	Goodwell	Heavener	Idabel	Miami	Perkins	Stilwell	Woodward
Red Clover								
No. 1 Mammoth			3		3	4	4	
Port Gibson			3		3	4	4	
Louisiana Syn. #1			3		3	4	4	
Kenland			3		3	4	4	
Nolin			3		3	4	4	
Libel			3		3	4	4	
Certified Midland			3		3	4	4	
Kentucky 215			3		3	4	4	
Ryegrass								
Perennial	3		3	3	3	4	4	
Common	3		3	3	3	4	4	
No. 12	3		3		3	4	4	
H-1	3		3	3	3	4	4	
S. 22 Aberystwyth	3		3		3	4	4	
S. 23 Aberystwyth	3		3		3	4	4	
S. 24 Aberystwyth	3		3	3	3	4	4	
S. 101 Aberystwyth	3		3	3	3	4	4	
Sainfoin	3		3	3	3	4	4	
Subterranean Clover								
Bacchus Marsh			4			4	4	
Tallarook			4			4	4	
Mt. Barker			4			4	4	
Nangeela			4			4	4	
Sudan								
Piper		4	4	4	4	4	4	
Common		4	4	4	4	4	4	
Sweet Common		4	4	4	4	4	4	
Lahoma		4	4	4	4	4	4	
Sweet S-1		4	4	4	4	4	4	
Greenleaf		4	4	4	4	4	4	
337		4	4	4	4	4	4	
Wheeler		4	4	4	4	4	4	
Tift		4	4	4	4	4	4	
Sweet 372		4	4	4	4	4	4	

TABLE I. --Continued

Variety	El Reno	Goodwell	Heavener	Idabel	Miami	Perkins	Stilwell	Woodward
Sweet Clover								
Spanish			4	4	4	4	4	
Evergreen			4	4	4	4	4	
S-65			4	4	4	4	4	
A-46			4	4	4	4	4	
Madrid			4	4	4	4	4	
Tifton			4	4	4	4	4	
Vetch								
Hairy			4			4	4	
Willamette			4			4	4	
Doark			4			4	4	
Auburn Woolypod			4			4	4	
Oregon Woolypod			4			4	4	
Madison			4			4	4	
Wheatgrass								
Nebraska 10	3					4		3
42-1	3					4		3
M2-10820	3					4		3
Ree	3					4		3
No. 571	3					4		3
Commercial Crested	3	3				4		3
A-12496	3	3				4		3
No. 50	3					4		3
A-1770	3	3				4		3
M2-10820-49	3					4		3
Turkish Crested	3					4		
White Clover								
Non-Certified Ladino			3	3	3	4	4	
Certified Blue Tag Ladino			3	3	3	4	4	
Pilgrim			3	3	3	4	4	
Louisiana Syn. #1			3	3	3	4	4	
Louisiana			3	3	3	4	4	
Winter Pea								
Austrian			4			4	4	
Romack			4			4	4	
Papago			4			4	4	

TABLE II -- Forage Yields and Protein Content; El Reno, Oklahoma, 1954.

Variety or Strain*	1954 Forage Yield lbs/acre	1954 Rank	Protein (Percent)
Alfalfa (Hay Types)			
Du Puits	7787	1	17.34
Ranger	7551	2	18.02
Atlantic	7496	3	19.16
Narragansett	7478	4	18.38
W-268	7423	5	17.64
Oklahoma Common	7406	6	18.27
Williamsburg	7223	7	17.16
Nevada Syn. A	7134	8	16.97
Buffalo	7116	9	17.91
Sazovakir	7115	10	16.67
Talent	6952	11	17.98
Vernal	6916	12	18.73
Sockeville	6443	13	18.12
Rhizoma	6226	14	19.99
Alfalfa (Pasture types)			
Sazovakir	7079	1	17.18
Stafford	6625	2	18.68
A-224	6570	3	19.09
Turkish Wild	6299	4	18.56
Rhizoma	5863	5	20.27
Ladak	5137	6	18.92
Nomad	4374	7	17.39
Sevelra	4120	8	18.76
Brome			
Achenback	3939	1	13.84
Lyon	3412	2	15.72
Lancaster	3267	3	14.78
Woodward	3249	4	15.65
Southland	3104	5	14.97
Lincoln	3050	6	12.78
Fischer	2995	7	15.53
Elsberry	2577	8	14.72
Fescue			
19-G1-25	6371	1	13.62
Kentucky 31	5663	2	12.73
4-36	4828	3	14.43
Alta	4538	4	12.32
Alta # 144	3703	5	12.89
Goar	3104	6	13.84
Orchard grass			
F-52	2940	1	13.16
M2-11142-50	2305	2	11.97
Oregon 233	2196	3	13.53
Beltsville	2196	4	12.47
Commercial	2160	5	9.97
Trogdon	2160	6	14.22
ADEFA	2069	7	13.84
Akeroa	1852	8	13.91
H-2	1525	9	13.97
No-88	1452	10	14.16
Palestine	525	11	10.53

* See Appendix for Individual Forage Test Information

TABLE III -- Forage Yields and Protein Content; Goodwell, Oklahoma, 1954

Variety or Strain*	1954 Forage Yield lbs/acre	Rank	Protein (Percent)
Alfalfa (Pasture types)			
Ladak	8156	1	20.85**
Sevelra	7550	2	21.28
Stafford	7115	3	20.66
Nomad	6583	4	22.02
Turkish Wild	6317	5	21.42
Sazovakir	4030	6	19.83
Brome			
Lincoln	6498	1	16.60
Martin	5628	2	16.78
Mandon 404	5409	3	17.20
Fischer	5396	4	17.27
Canadian Commercial	5372	5	19.60
Lyon	5348	6	14.91
Southland	5107	7	15.59
Homesteader	4756	8	16.60
Manchar	4150	9	16.50
Lancaster	3340	10	16.81
Elsberry	2868	11	17.34

* See Appendix for Individual Forage Test Information

** Percent protein of alfalfa varieties is the average of last two cuttings onl

TABLE IV. -- Forage Yields and Protein Content; Perkins Farm, 1952 to 1955

Variety or Strain*	1954			1953			1952		
	Forage Yield		Protein	Forage Yield		Protein	Forage Yield		Protein
	lbs P/A	Rank	(Percent)	Lbs. A	Rank	(Percent)	Lbs P/A	Rank	(Percent)
Alfalfa									
Stafford	944	1	17.81	5589	2	17.21	1883	2	24.23
Oklahoma Common	932	2	17.50	6292	1	17.04	1959	1	22.90
Buffalo	896	3	18.03	5251	3	17.99	1738	3	23.86
Pilca Butta	895	4	17.59	5034	4	17.97	1530	4	23.37
Oregon Creeping	617	5	17.95		5	20.42		5	
A. old				2759			628		
B. Nomad				4598			1238		
Lespedeza									
Iowa 6	1779	1	14.03						
Climax	1724	2	14.38						
Korean	1543	3	16.95						
Rowan	1307	4	14.22						
Sweet Clover									
Madrid	3246	1	14.28	2846	1	32.13			
Spanish	2632	2	15.63						
A-46	2305	3	13.66	2231	4	32.03			
Evergreen	2196	4	13.97	2805	2	32.00			
S-65	1688	5	13.28						
Bi-white				2524	3	31.59			

* See appendix for individual forage test information

TABLE V. -- Forage Yields and Protein Content, Stilwell, Oklahoma, 1954.

Variety or Strain*	1954 Forage Yield lbs/acre	Rank	Protein (Percent)
Lespedeza			
Rowan	1065	1	15.30
Iowa 6	944	2	14.85
Korean	920	3	17.00
Climax	847	4	14.05

* See appendix for individual forage test information

TABLE VI. -- Fertility Studies on Lahoma Sweet Sudan*; El Reno, Oklahoma 1954. Irrigated.
Yields of Forage Corrected to 12% Moisture

Pasture Plots

Treatment**:	T_1A_1	T_1A_2	T_2A_1	T_2A_2	T_3A_1	T_3A_2	T_4A_1	T_4A_2	T_5A_1	T_5A_2
X Tons	5.14	5.48	5.08	4.88	4.98	5.25	5.51	5.15	5.05	5.12

C.V. = 14.52 %

Hay Plots

Treatment:	T_1A_1	T_1A_2	T_2A_1	T_2A_2	T_3A_1	T_3A_2	T_4A_1	T_4A_2	T_5A_1	T_5A_2
X Tons :	6.22	6.64	5.92	8.07	6.42	6.89	6.45	6.51	6.59	6.60

C.V. = 11.64 %

* These yields were produced on inherently fertile bottomland soils which had been fallow the two preceding years.

** Treatment: T_1 = Check
T_2 = 20 pounds nitrogen per acre
T_3 = 40 pounds nitrogen per acre
T_4 = 80 pounds nitrogen per acre
T_5 = 20 pounds nitrogen per acre plus 80 pounds ammonium phosphate
A_1 = Applied all fertilizer May 7, 1954.
A_2 = Applied $\frac{1}{2}$ fertilizer May 7, 1954.
Applied $\frac{1}{2}$ fertilizer June 29, 1954.

TABLE VII. -- Forage Yields of Sudan Grass at Different Stages; Perkins Farm.

Variety or Strain	1954 Forage Yield (Lbs. per acre)		1953 Forage Yield (Lbs. per acre)	
	Pasture Stage	Hay Stage	Pasture Stage	Hay Stage
Piper	801	895	5975	6680
Wheeler	782	977	5780	6569
Common	765	1059	5868	5683
Greenleaf	672	759	5467	6003
S - 1	777	1132	3760	4640
Commercial Sweet	875	1108	4711	5117
Georgia 337	850	1080	4671	5503
USDA #4	---	----	5333	6064
Tift	875	958	4670	5664
Texas 372	777	1146	4098	4351
Lahoma	716	1152	4337	4997
S -23	759	1264	----	----

(PART II)

SOUTHEAST OKLAHOMA PASTURE FERTILITY RESEARCH STATION
Coalgate, Oklahoma

Summary Progress Report, 1950-1953

By J. Q. Lynd

Oklahoma Agricultural Experiment Station Bulletin B-445, January 1955, 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.

Revised Pasture Experiments

Following the 1953 grazing season, the Southeast Oklahoma Pasture Fertility Experiment Station was revised to determine pasture productivity of forage combinations on different land types receiving various soil fertilit treatments comparing fertilizer kinds, rates and method of application.

The station now consists of 26 various sized pastures occupying 580 acres supporting 160 Hereford steers in three experimental herds. Particularly outstanding are the perennial cool season grass-legume pastures (fescue, brome, orchard grass, alfalfa, white and Ladino clovers.)

Six nurseries include comparisons of nitrogen, phosphorus and potassium treatments on improved strains of bermuda grass, perennial cool season grasses and legumes, 10 varieties of oats, subtillage of clay pan soils, deep placement of fertilizer and seeding of small grains in bermuda sod.

PASTURE MANAGEMENT STUDIES, 1954

By W. C. Elder

Growing conditions in Oklahoma, during 1954, were favorable for forage production of winter legumes and winter grasses. Good rains in September and October, 1953 started these crops off in good condition for winter grazing. Dry conditions in mid-winter, 1953-1954, lowered pasture production in March and April to some extent, but mild weather made it possible for winter crops to make some growth each month. Good rains in May revived all winter crops and started the summer forage crops off in good condition. However, subsequent hot, dry weather stopped all vegetative growth in mid-June. The drought continued at the Heavener Experiment Station until September, and at the Stillwater and Perkins Stations until the first of January, 1955. Cattle had to be removed from the pastures in August and September. This reduced grazing 35 to 50 days from normal season expectation. It was the surplus growth produced during the favorable conditions in May and early June that carried the animals during July and August. Pastures that were grazed heavily in May and June were of little use for the remainder of the season.

Some grazing was necessary on the Heavener Station in November and December to remove annual brome grass that was revived by the fall rains. No attempt was made to measure this grazing in terms of beef production. The surplus growth was removed to eliminate competition with the winter legumes that were in the seedling stage.

The wild annual bromes, especially hairy brome (Bromus commutatus), are common in eastern Oklahoma some years in Bermuda grass pastures. They are more prevalent where good growth of legumes occur, and on heavily grazed areas where manure has accumulated. Benefit or damage from these annual grasses is debatable. They furnish a small amount of green forage in mid-winter and make a vigorous growth for a short time in April and May. These annuals are not dependable every year, but when present in the spring months, they remove some danger of bloat from legumes. Grazing animals in April and May usually make more gain than when the legumes alone are present.

Pasture Studies on the Heavener Station

The Heavener Experiment Station is located in LeFlore County in southeastern Oklahoma. All of the pastures considered here have been established on cultivated upland soils characteristic of the southern Ozarks. The pastures under study were planted to some of the more promising species adapted to the area. Since the soils of this area are usually low in minerals, commercial fertilizer has been, by necessity, an important part of the studies.

Bermuda Grass and Winter Clovers. Fertility Study.

Bermuda grass overseeded with winter clovers is a common planting in this area. In this study, a pasture of this mixture (Bermuda grass, Black medic, Hop and White clovers), that had been established and under grazing for 15 years was divided into 4 parts, with 2 pastures receiving 2 tons of lime in 1949 and an annual application of 200 pounds 0-20-0 per acre plus 100 pounds of muriate of potash every third year. The other two have not received fertilizer since 1948.

Grazing cattle have been weighed from these pastures each month during the grazing season of the last five years. Table I gives monthly rates of gain for each pasture in 1954. For the five-year average the fertilized pastures produced 265 pounds of beef per acre and the non-fertilized pastures produced 174 pounds beef per acre. Fertilizers have increased beef production primarily by increasing the clover production. The good yield of 174 pounds per acre on the non-fertilized pastures was brought about by the long time establishment and growth before the fertilizers were discontinued. Had the study started on new plantings on old cultivated soil of the area, the difference in results would have been greater.

Vetch and Bermuda Grass Pastures

An old stand of Common Bermuda grass was renovated and planted to vetch in 1950. Two hundred pounds of 0-20-0 is applied in October each year. Vetch is permitted to produce sufficient seed for volunteer growth each year. This is easily accomplished by stocking the pasture at summer rates, as there is a surplus growth of vegetation at the time of vetch seed production. This combination appears to make better pasture in the summer months than the Bermuda grass and clover pastures. Table II shows the 1954 results and the three-year average for this pasture.

Ladino-Fescue and Dallis Grass Pastures

Ladino clover was killed in June and July, 1952, 1953, and 1954 by dry conditions. Fescue survived the drought and made good growth in the fall and winter months. Table II shows 1954 grazing results.

Dallis grass withstood the drought and heavy grazing in good shape. Good clover growth in April and May, 1954 made this an excellent pasture. Table II shows grazing results.

At the Agronomy Farm, Stillwater

Pastures at this location have a wide range in soils. Phosphorus is used on some of them to stimulate legume growth, and on others nitrogen is used to benefit the grasses. One-year-old Hereford heifers, weighing approximately 500 pounds each, were used for grazing purposes.

Commercial Nitrogen on Common Bermuda Grass

These two pastures have a good stand of Common Bermuda grass on high fertility land. One pasture is fertilized with 150 pounds of 33% ammonium nitrate in April and again in July. Because of the extreme dry weather the July application was not made in 1954. Table III shows results of grazing.

Midland Bermuda Grass Pastures.

Midland Bermuda grass is a new hybrid released from the Oklahoma Experiment Station in 1953. This strain was established on soils of low fertility in 1951. One pasture received 100 pounds of nitrogen each year (50 pounds in April and 50 pounds in July). A second pasture was overseeded with vetch and 200 pounds of 0-20-0 applied in October each year. 1954 was a very good vetch year. See Table IV for grazing results.

Tall Fescue, Smooth Brome and Alfalfa Pastures

Kentucky #31 fescue was planted in 14-inch rows in one pasture and Southland brome grass in the second pasture. Alfalfa was seeded between the rows in one drilling operation. The soils in these pastures are considered below the fertility level for good alfalfa growth. Two hundred pounds of 0-20-0 is applied in October each year.

Cattle were maintained in these pastures during the winter, 1953-1954, without supplementary feed. Gains were small for these months, but the cost of maintaining animals during this period is always high if hay and protein supplement are used for wintering. Gains in these pastures were disappointing in the spring months, but good soil moisture in May produced a surplus of vegetation.

The summer and fall drought apparently destroyed most of the fescue and brome grass in these pastures. Alfalfa survived the extended severe condition much better than the grasses. Table V shows grazing results for 1954.

Temporary Winter Pastures

Vetch and small grains are a popular combination for winter pastures in Oklahoma. More than 500,000 acres are planted to vetch in the state, most of it being with rye. Barley makes more growth in the fall months than rye, but rye is superior in the winter months for pasture.

Three pastures were planted in mid-September, 1953 with one bushel rye, one bushel barley and 15 pounds of vetch per acre and fertilized with 200 pounds 0-20-0. All pastures were treated alike in seedbed preparation, planting, fertilizing time, etc. Pastures 1 and 2 were located on good bottom soil classified as No. 1 (see Table VI). The three preceding crops were wheat with summer fallow. Pasture No. 3 was on class IV soil that had been in vetch and rye for three years. Approximately 200 pounds of beef per acre was produced each year with some of the vetch turned under in June after the grazing season. Pastures 1 and 3 were similarly grazed. Hereford heifers, weighing 400 to 500 pounds, were used in the pastures at the rate of one animal per acre for the 175-day grazing period. Beef gains were almost identical for the two pastures on different classes of land. This is explained by the fertility build-up in pasture No. 3 by manure from animals in former years and the vetch that was returned to the soil as green manure.

Pasture No. 2 was divided into four parts and grazing was rotated. Animals were moved from one division to another when the vegetation became too short for good grazing. Animals in the rotated pastures did not gain more than in the continuously grazed pasture but the accumulation of forage in the rotated pasture made it necessary to use more animals during the last of the grazing period and increased gains from 266 pounds up to 307 pounds per acre. Cattle were removed from these pastures May 17. Most of the rye and barley was completely gone except in the rotated pasture. The vetch made good growth, and 200 pounds of seed per acre was harvested from all the pastures.

Gains of approximately 1.5 pounds daily for animals less than one year old for 175 days is very good. This is more gain per animal than is produced on the best spring and summer pastures in the state. Unfortunately winter pastures are not dependable. Dry weather is a common occurrance in October and November when the vetch and cereals are getting established and making good growth. This was true in 1954, consequently the same pastures repeated in the above tests have not produced sufficient forage for grazing up until March 1, 1955.

TABLE I -- Grazing Results on Common Bermuda Grass with Hop and White Clovers, Fertilized and Unfertilized; Heavener, 1954.

Weighing Dates	Pasture No. 1*			Pasture No. 2			Pasture No. 3*			Pasture No. 4		
	Acres Per head	Daily gain (lbs)	Gain per acre (lbs.)	Acres per head	Daily gain (lbs.)	Gain per acre (lbs.)	Acres per head	Daily gain (lbs.)	Gain per acre (lbs.)	Acres per head	Daily gain (lbs.)	Gain per acre (lbs.)
4/2-4/30	1.1	2.7**	70	1.1	1.9	50	1.1	1.8	49	2.1	2.0	27
5/1-5/26	.7	2.8	99	1.1	2.8	66	.8	2.7	75	1.4	2.9	54
5/27-6/30	.7	1.2	60	1.1	1.5	45	.8	1.4	55	1.4	1.5	36
7/1-8/3	.7	.4	20	1.1	.7	21	.8	.5	18	1.4	.7	17
8/4-8/17		- .2	- 3	1.1	.0	0	1.1	.2	3	1.4	- .4	- 4
TOTAL			246			182			200			130

* Pastures 1 and 3 receive an annual application of 200 pounds superphosphate and 33 pounds muriate of potash per acre. Pastures 2 and 4, no fertilizer since 1948.

** Weight of steer April are approximately 500 pounds. For the 137-day pasture period the steers in fertilized pastures gained 202 pounds and 192 pounds in the unfertilized pastures.

TABLE II. --- Beef per Acre Produced on Bermuda Grass-Vetch, Fescue-Ladino and Dallis Grass-Legumes Pastures; Heavener, 1954

Weighing Dates	Pounds of Beef per acre Gain				
	Bermuda Grass-Vetch			Fescue-Ladino	Dallis Grass-Legume
	Acres per head	Daily gain lbs.			
4/2-4/30	1.0	2.4	68	50	45
5/1-5/26	1.0	2.4	62	81	122*
5/27-6/30	1.0	2.0	67	86	47
7/1-8/3	1.0	.9	30	26	24
8/4-8/17	1.0	.3	5		
Total			232	233	238

* Large number of animals used as it was necessary to utilize surplus forage accumulated from previous month.

TABLE III -- Beef Cattle Gains on Common Bermuda-grass; Unfertilized, and with Ammonium Nitrate; Agronomy Farm, Stillwater, 1954.

Weighing Dates	Nitrogen Fertilizer*			No Treatment		
	Acres per head	Gain per acre (pounds)	Daily gain per head (pounds)	Acres per head	Gain per acre (pounds)	Daily gain per head (pounds)
April 14 - May 4	1.4	31	2.1	1.4	21	1.4
May 5 - June 2	.7	66	1.5	.9	42	1.3
June 3 - July 3	.7	68	1.5	.9	24	1.1
July 31 - Aug. 31	.9	16	.5	1.4	15	.6
Sept. 1 - Sept. 25	.9	9	.3	1.4	0	0
Total		251			157	

* 150 pounds Ammonium nitrate applied in April but not in July, 1954.

Three year average for these pastures, including 1954:
298 pounds beef per acre on fertilized pastures.
153 pounds beef per acre on unfertilized pastures.

TABLE IV -- Beef Cattle Gains on Midland Bermuda-grass; with Legumes, vs. Fertilization with Ammonium Nitrate*, Agronomy Farm, Stillwater, 1954.

Weighing Dates	With Legumes			With Ammonium Nitrate*		
	Acres per head	Gain per acre (pounds)	Daily gain per head (pounds)	Acres per head	Gain per acre (pounds)	Daily gain per head (pounds)
April 14 - May 4	1.0	33	1.6	1.5	30	2.2
May 5 - June 2	.75	60	1.6	1.0	47	1.6
June 3 - July 3	.75	63	1.5	1.0	34	1.1
July 4 - July 30	.75	50	1.4	1.0	45	1.7
July 31 - August 31	.75	-8	-.2	1.0	-3	-.1
Sept. 1 - Sept. 24	.75	17	.5	1.0	8	.3
Total		215			161	

Beef gain per acre in 1952 was 313 pounds.
Beef gain per acre in 1953 was 231 pounds.

* Only 50 pounds of nitrogen applied in 1954 (April).
In 1952 and 1953 one hundred pounds of nitrogen was applied each year (50 pounds in April and 50 pounds in July.)

TABLE V -- Grazing Results from Alfalfa-Fescue and Alfalfa-Brome Grass Pastures
Oklahoma Experiment Station, Stillwater

Weighing Dates	Fescue + Alfalfa			Brome + Alfalfa		
	Acres per head	Gain per acre (Pounds)	Daily gain per head (Pounds)	Acres per head	Gain per acre (Pounds)	Daily gain per head (Pounds)
Nov. 23 - Dec. 29, 1953	1.0	25.0	.7	1.3	9	.3
Dec. 30,1953 - Feb. 2,1954	1.3	2.5	.1	2.0	5	.3
Feb. 3 - March 4	1.3	14.0	.6	2.0	-4	-.2
March 5 - April 3	1.3	24.0	1.1	2.0	10	.7
April 4 - May 4	1.3	20.0	.9	2.0	29	1.8
May 5 - June 2	1.3	12.0	.5	2.0	10	.7
June 3 - July 3	1.3	15.0	.6	1.3	16	.7
July 4 - July 30	2.0	16.0	.9	1.3	33	1.6
July 31 - Aug. 31	2.0	.0	.0	1.3	9	.4
Total		128.5			121.0	

TABLE VI -- Results from Temporary Winter Pastures of Rye, Barley and Vetch, Oklahoma Experiment Station, 1953-1954

Weighing dates	Pasture No. 1 Continuous Grazed			Pasture No. 2 Rotation Grazed			Pasture No. 3 /1 Continuous Grazed		
	Acres per head	Gain P/A pounds	Daily gain/lbs per head	Acres per head	Gain P/A pounds	Daily gain/lbs per head	Acres per head	Gain P/A pounds	Daily gain/lbs per head
Nov. 23-Dec. 28,1953	0.8	84	1.6	0.8	72	1.4	1	54	1.6
Dec.29,1953-Feb.2,1954	1.0	48	1.4	1.0	51	1.5	1	62	1.7
Feb. 2 - March 4	1.0	38	1.3	1.0	43	1.4	1	54	1.7
March 4 - April 3	1.0	28	0.9	1.0	43	1.4	1	31	1.0
April 4 - May 4	1.0	65	2.1	0.8	77	1.8	1	45	1.5
May 5 - May 17	1.5	3	.8	0.8	21	1.3	1	18	1.3
Total		266			307			264	

/1 Soil in Pasture No. 3 is classified as Class IV soil. In Pastures No. 1 and No. 2 as Class No. II soil. No. 3 Pasture had been in rye and vetch and pastured the three preceding years and summer fallowed. Pastures No.1 and No. 2 had been in wheat and summer fallowed the three preceding years.

Pastures on Perkins Experiment Station

Fifty acres of sandy soil, previously in cultivation or covered with brush, has been established to several promising species and combinations of forage crops that are adapted to the central section of Oklahoma. Small plot clipping tests have been made on these crops in the past. A cow-calf herd of beef cattle is maintained on the pastures to observe the crops under actual grazing conditions and to determine the best management practices for the crops. Cattle weights are taken from only a few of the pastures.

Vetch is the best adapted legume for this sandy soil, with Korean lespedeza ranking second. Rye and vetch make an ideal combination for these soils. Winter pastures from these crops were outstanding in 1953-1954. They eliminated the need for feeding high-priced protein supplements and hay. Also, the cows calving in February and March produced a strong flow of milk that started the calves off in good shape.

A plan of management to maintain temporary pastures of vetch and rye in the winter, and sudan in the summer on a minimum of acres has been worked out successfully. If sudan follows the rye-vetch crop each year, it is difficult to have a fall and winter pasture because of moisture deficiency at the time of planting. Sixteen acres are planted to vetch and rye each year. The pasture is divided and one area is grazed heavily until April 15 and then allowed to produce a good cover of vetch. It is disked under in May and planted to sudan. This pasture is planted to rye and vetch when moisture conditions are good in the fall months, but little grazing is secured until the spring months of the next year. The second pasture is grazed until all rye and vetch are gone, usually in late June. The land is summer fallowed, then planted to rye and vetch in September. This makes a good pasture in the winter months. The management practice is reversed on these two pastures the second year. This assures 8 acres of fall and winter pasture, 8 acres of spring grazing of vetch and rye, and 8 acres of sudan each year from 16 acres of land.

The summer drought of 1954 was a very good test for four summer grasses grazed in separate pastures.

K. R. and Caucasian bluestem, overseeded with vetch did not compare with Bermuda and Weeping lovegrass. It seemed that the heavy growth of vetch in May injured these grasses more than the Bermuda grass, for little grazing was afforded from the bluestems after June. Bermuda grass and vetch made the best pasture combination in 1954 and this is true of the study in the past years. Vetch will establish itself in a mat of Bermuda grass any time during the fall or winter months when moisture conditions are good. Some vetch is permitted to produce seed in June each year for volunteer seed. When seed is produced some vegetation is returned to the soil to aid the Bermuda grass during the summer months. It is easy to manage Bermuda and vetch for some seed production. Vetch always makes a surplus growth in May. If stocking rates are set up for summer grazing, some seed and vetch vegetation is returned to the soil in May and June.

Weeping lovegrass produced more green vegetation in the dry fall months of 1954 than any other species. As in 1953, one pasture of lovegrass was fertilized with 50 pounds of nitrogen in April and again in July. It has been observed that cattle always prefer the lovegrass that was treated with nitrogen. However, in

the 1954 test (also in 1953) the individual animal weights were no different on fertilized and non-fertilized lovegrass. More animals could be grazed on the fertilized pasture and the cattle gain per acre was greater, but individual weights of cows and calves were the same. Application of commercial nitrogen was not economical for either year on weeping lovegrass.

Cows made good gains in May, little gain in June, and lost weight in July and August on lovegrass. Calves gained approximately 1.5 pounds daily during the four month grazing period.

In comparing weights of cows and calves on weeping lovegrass with similar animals on Bermuda grass for 120 days grazing, it was found that calf weights were the same but cows on Bermuda grass were 100 pounds or more heavier than cows on lovegrass.

It has been difficult to establish smooth brome and tall fescue pastures on this site, probably because of sandy soil. Pastures planted to these species in the fall, 1953, failed in 1954 although a good stand was established in the fall and winter, before the dry summer months.

APPENDIX A

Table II -- Standard Alfalfa Test --Oven dry hay; Average of 4 replications (planted Oct 1, 1953; cut June 21, July 21, August 20, 1954) El Reno, Oklahoma. Soil type and texture -- Brewer, clay loam.
L. S. D. 5% = Pasture type = 1367 lbs.
Hay type = 997 lbs.

Table II -- Standard Brome Test --Oven dry hay; average of 4 replications (planted Sept. 29, 1953, cut June 17, 1954). El Reno, Oklahoma.
Soil type and texture -- Brewer, clay loam.
L. S. D. 5% = 727 lbs.

Table II -- Standard Fescue Test --Oven dry hay; Average of 4 replications (planted Sept. 29, 1953; cut June 16, 1954) El Reno, Oklahoma,
Soil type and texture -- Brewer, clay loam.
L. S. D. 5% = 1247 lbs.

Table II -- Standard Orchard grass Test --Oven dry hay; Average of 4 replications (planted October 1, 1953; cut June 18, 1954) El Reno, Oklahoma.
Soil type and texture -- Brewer, clay loam.
L. S. D. 5% = 1025 lbs.

Table III-- Standard Alfalfa Test --Oven dry hay; average of 3 replications. (planted Sept. 11, 1953; cut July 14, August 26, October 19, 1954) Goodwell, Oklahoma. Soil type and texture --
L. S. D. 5% = 1343 lbs.

Table III-- Standard Brome Test --Oven dry hay; average of 2 replications. (planted Sept. 11, 1953; cut July 14, October 19, 1954)
Goodwell, Oklahoma. Soil type and texture --
L. S. D. 5% = 2556 lbs.

Table IV -- Dry Land Alfalfa Test --Oven dry hay; average of 6 replications. (planted September 21, 1951; cut May 6, June 18, and July 30, 1953; cut June 11, 1954) Perkins, Oklahoma. Soil type and texture -- Teller, very fine sandy loam.
1953 - L. S. D. 5% = 1535 lbs.
1954 - L. S. D. 5% = 128 lbs.

Table IV -- Standard Lespedeza Test --Oven dry hay; average of 4 replications. (planted May 14, 1954; cut August 19, 1954) Perkins, Oklahoma.
Soil type and texture -- Norge, fine sandy loam .
L. S. D. 5% = 187 lbs.

Table IV -- Standard Sweet Clover Test --Oven dry hay; average of 4 replications. (planted March 25, 1953; cut June 5, 1954). Perkins, Oklahoma.
Soil type and texture -- Norge, fine sandy loam.
L. S. D. 5% = 596 lbs.

Table V -- Standard Lespedeza Test --Oven dry hay; average of 3 replications. (planted May 28, 1954; cut August 24, 1954) Stilwell, Oklahoma.
Soil type and texture --
L. S. D. 5% = 322 lbs.

Table VI -- Fertility Studies on Lahoma Sudan --12% moisture hay; average of 4 replications. (planted April 7, 1954; cut for pasture June 22, July 13, July 29, August 26, and October 12, 1954; cut for hay June 24, July 30, and September 15, 1954.
El Reno, Oklahoma.
Soil type and texture -- Brewer, clay loam.

Table VII-- U. S. D. A. Uniform Sudan Test --12% moisture hay; average of 4 replications. (planted June 2, 1954; cut for pasture July 27, 1954; cut for hay July 27, 1954. Perkins, Oklahoma.
Soil type and texture -- Norge, fine sandy loam.
Variety differences for pasture highly significant. C. V. = 18.95%
Variety differences for hay significant. C. V. = 18.14%
L. S. D. 5% (pasture) = 186 lbs.
1% (pasture) = 249 lbs.
L. S. D. 5% (hay) = 238 lbs.
1% (hay) = 319 lbs.