KERN COUNTY LAND COMPANY
AND SUBSIDIARIES
BAKERSFIELD, CALIFORNIA

To: All Concerned

Date: February 24, 1961

From: Technical Services Division

File:

Subject: Progress Report No. 1 on Project No. 101
(Range Fertilization at Intermediate Elevations)

The three test sites established in this project have been observed at 4 to 6 week intervals from the fertilizer application date, November 20, 1960 until the present time.

An average of 1.50 inches of rainfall has been recorded on the cumulative-type rain gauge at each location during this period.

During the period November 20, 1960 through February 2, 1961, there was no measurable difference in forage production between fertilized and unfertilized plots. During this period, approximately 0.40 inches of rainfall was recorded in the test areas. However, during the period February 3, 1961 to February 24, 1961, approximately 1.10 inches of rainfall has been recorded which has resulted in significant forage response. Treatments Nos. 2, 4, 7, 8 and 9 (see original project outline for fertilizer and application rates) on all three test sites show production increases estimated at 1.25 to 2.0 times that of unfertilized range. This production will be measured and converted to terms of pounds of feed per acre in the next scheduled forage "clipping" on March 9, 1961. Throughout the term of this test, plants in all fertilized plots have displayed a distinct dark green color, indicating a high chlorophyll content. This condition is commonly referred to as "greening up." Thus, in the earlier stages of this test, although fertilizers did not significantly increase forage production, they did hasten the beginning of the growth cycle and increase the chances of earlier and, ultimately, more feed when rainfall was received.

EAL:rp

cc: Messrs. Cochran, Davis, Hartmann, Hawkins
Breusing, Caire, Quarre, Stanfield, Tarnow, Tietze

KERN COUNTY LAND COMPANY

BAKERSFIELD, CALIFORNIA

To: All Concerned Date: July 7, 1961

From: Technical Services Division File:

Subject: Progress Report No. 2 on Project No. 101
(Range Fertilization at Intermediate Elevations)

Conclusions

All fertilizers tested in this project produced a measurable forage response that was greater than that of the unfertilized plots. This indicates that definite soil-nutrient deficiencies exist on San Emidio Ranch.

A direct relationship exists between amounts of moisture on the plots and rates of forage production, regardless of the type or amount of fertilizer applied.

On the basis of this test, ammonium sulfate is the only fertilizer which warrants further study in this area and under these conditions. However, because of wide variations in response to fertilization, results are not statistically significant.

Recommendations

1. The test plots should be observed during the 1961-62 rainfall season and clipped if the forage response warrants it.

2. The project should be terminated at the end of the 1961-62 rainfall season.

3. A larger test area (possibly 40 acres) should be established before the start of the 1961-62 rainfall season to test ammonium sulfate as a fertilizer on a pilot-scale basis. The selected area should have a high percentage-composition of desirable grasses and a low percentage of forbs.

Results

The three fertilization test sites established by this project near Horse Spring, Tevis Spring and Haven Spring were observed at 4-6 week intervals during the period November 20, 1960 - May 5, 1961.

Rainfall since November 1, 1960 amounted to 7.80" at Horse Spring, 5.60" at Tevis Spring and 4.60" at Haven Spring. This 6.00" rainfall average is considerably below the expected norm for 2,500' to 3,500' elevations in this area. Approximately 30% of the seasonal rainfall came in November, when temperatures were too low for good seed germination and there was little benefit to forage production.

Forage production clippings were taken on March 8 and May 5, 1961, rather than at 4-week intervals, because of late seed germination and uneven vegetation response and growth.

A wide variation in vegetation composition of grazing range occurs on this ranch. The following table indicates the forage composition at each of the test sites.

Table No. 1
Percentage Forage Composition

	Horse Spring	Tevis Spring	Haven Spring
Desirable Annual Grass	40%	5%	47%
Undesirable " "	29	15	15
Perennial Grass	1	0	3
Forbs	30	80	35

The results of this fertilization test in terms of (a) increase in forage production, (b) cost of fertilization (not including application costs), and (c) potential increase in livestock production, are presented in the following tables. No measurable forage response from fertilization was obtained at the Tevis Spring test site. This is probably due to the relatively high percentage of forbs in the forage composition at the site. Consequently, only the production on the unfertilized check plots at this site are given in the data.

Table No. 2

Fertilizers, Fertilizer Costs and Increased Forage Production From Range Fertilization

Plot No.	Fertilizer	Rate of Actual Units Nutrient/Ac N	P	S	Rate of Fertilizer per Acre (Pounds)	Cost of Fertilizer* ($ per Acre)	Pounds of Forage per Acre (dry weight) Horse Spring	Haven Spring
1	Ammonium Nitrate	40	0	0	120	5.16	1,889	379
2	20-20-0 Nitric Phosphate	40	40	0	200	8.40	3,553	900
3	20-10-0 Nitric Phosphate	80	40	14	400	14.00	3,487	1,183
4	Ammonium Sulfate	40	0	47	194	4.85	2,039	1,987
5	Check	-	-	-	-	-	1,419	583
6	Ammonium Nitrate	80	0	0	240	10.32	3,237	686
7	20-20-0 Nitric Phosphate	80	80	0	400	16.80	2,055	2,086
8	16-20-0 Ammonium Phosphate	80	100	76	500	18.50	2,231	1,905
9	Ammonium Sulfate	80	0	93	388	9.70	3,922	2,197
10	Check	-	-	-	-	-	897	343

* Cost of fertilizer does not include the cost of application.

plots, expressed in animal unit months (AUM) and dollars per acre, the increased value of the treated plots due to fertilization, and the net increased return after fertilizer costs are deducted.

Table No. 3

A Comparison of the Grazing Value of
Fertilized and Unfertilized Annual Range

Plot No.	Animal Units Grazing (AUM)	Value of Grazing ($/Acre)	Value Above Unfertilized ($/Acre)	Value Above Fertilizer Cost ($/Acre)
		HORSE SPRING		
1	2.60	23.03	8.74	3.58
2	4.90	43.46	29.17	20.77
3	4.80	42.75	28.46	14.46
4	2.80	31.11	16.82	11.97
5	2.00	17.80	--	--
6	4.40	39.18	24.89	14.57
7	2.80	31.11	16.82	0.02
8	3.00	26.60	12.31	(6.19)
9	5.10	45.36	31.07	21.37
10	1.20	10.78	--	--
		HAVEN SPRING		
1	0.60	5.22	0.12	(5.04)
2	1.25	10.92	5.82	(2.58)
3	1.60	14.25	9.15	(4.85)
4	2.70	23.98	18.88	14.03
5	0.70	6.17	--	--
6	0.90	8.07	2.97	(7.35)
7	2.90	25.65	20.55	3.75
8	2.60	23.13	18.03	(0.47)
9	3.00	26.60	21.50	11.80
10	0.47	4.03	--	--
		TEVIS SPRING		
1	--	--	--	--
2	--	--	--	--
3	--	--	--	--
4	--	--	--	--
5	0.25	2.25	--	--
6	--	--	--	--
7	--	--	--	--
8	--	--	--	--
9	--	--	--	--
10	0.37	3.16	--	--

EAL:rp

cc: Messrs. Cochran, Hartmann
Breusing, Caire, Quarre, Stanfield, Tarnow, Thompson, Tietze

KERN COUNTY LAND COMPANY

BAKERSFIELD, CALIFORNIA

To: C. M. Quarre'

Date: November 24, 1961

From: Technical Services Division

File:

Subject: Progress Report No. 3 on Project No. 101
(Range Fertilization at Intermediate Elevations)

The condition and results obtained from initial test plots in this project were reported in an earlier progress report. These areas will be observed and measured for carry-over fertilizer response during the period February--May, 1962. A final report of this phase of the project will be prepared at that time.

As a result of earlier favorable results and recommendations, a 20-acre plot near the Horse Spring test site was fertilized with ammonium sulfate on October 19, 1961. The fertilizer was applied by aircraft at the rate of 300# material (60# N) per acre.

This work was a cooperative effort involving Atwood Crop Dusters, who donated services of aircraft and pilot, California Spray-Chemical Company, who donated half of the fertilizer, and the Cattle Division, who provided the other half of the fertilizer and test site.

This area will be observed and measured during the 1961-62 growth period. The results of this phase of the project will be reported in the summer of 1962.

EAL:rp
cc: J. J. Hartmann

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KERN COUNTY LAND COMPANY

BAKERSFIELD CALIFORNIA

To: C. M. Quarre' Date: July 12, 1962

From: Technical Services Division File:

Subject: Progress Report No. 5 on Project No. 101
(Range Fertilization at Intermediate Elevations)

The three original test plots located at Horse, Tevis, and Haven Springs, together with the 20-acre plot near Horse Springs that was fertilized by aircraft in October, 1961, were observed on July 9, 1962.

No significant difference in either total forage production or length of green-feed grazing season exists between the 20-acre plot at Horse Springs and adjacent unfertilized range. It is not known at this time whether this lack of forage response is due to low rainfall or to the rate and type of fertilizer applied. The plot will be observed during the winter rainfall season of 1962-63 for possible carry-over effects and a final report on this particular test will be prepared in May, 1963.

A marked increase in forage response took place on each of the three original test plots during the time interval between the last observation in February, 1962 and the most recent observation on July 9, 1962. During this period, 3.5 to 4.0 inches of rain fell over an extended period and probably accounts for this marked increase in production in both unfertilized and fertilized range.

Treatments No. 7, 8 and 9 (see Progress Report No. 2 dated July 7, 1961 for materials used) at all three test plots showed forage production increases of 80-200% over check treatments. Forage production in check treatments averaged between 750-900 pounds per acre, whereas production in fertilized treatments ranged from 1500-2500 pounds.

This response during the second year after treatment is exceptional for this area of the San Joaquin Valley, where range fertilization is generally not very successful.

Originally, it had been planned to terminate this project at the end of the 1961-62 rainfall season. However, in view of the unexpected heavy response this year, the project will be extended until June 1963, at which time a final 3-year report will be prepared.

EAL:rp

cc: J. J. Hartmann

KERN COUNTY LAND COMPANY

BAKERSFIELD CALIFORNIA

To: C. M. Quarre'

Date: March 1, 1962

From: Technical Services Division

File:

Subject: Progress Report No. 4 on Project No. 101
(Range Fertilization at Intermediate Elevations)

The three original test plots of this project, located at Horse, Tevis, and Haven Springs, together with the 20-acre plot near Horse Springs that was fertilized by aircraft in October, 1961, were observed on February 23, 1962.

Each of the three original plots fertilized shows a high rate of germination and general "greening up" and early growth is in progress. Plants growing on each of the fertilized treatments at the Haven and Horse Spring plots illustrate a growth response 20 to 50 percent higher than each of the check treatments. The largest responses were found on treatments that received either ammonium nitrate or ammonium sulfate. All treatments at the Tevis Spring plot are "greening up" but there is no significant difference in fertilized and check treatments at this time. This plot yielded the poorest results last year and the trend appears to be continuing in that direction this year.

Germination in the 20-acre aerially-fertilized plot near Horse Spring is about equal to adjacent unfertilized range, but early growth and "greening up" is further advanced. This condition is readily discernible when viewing the fertilized and unfertilized areas from a nearby hillside.

Daytime temperatures during the past 30 to 45 days, and particularly on the day of observation, have been well below normal for the area. This condition has retarded plant response greatly. It is expected that more meaningful response will be observed with the arrival of warmer temperatures.

EAL:rp
cc: J. J. Hartmann