Table 36
Feedstuff analyses, 1963-64.

	Moisture, %	Dry matter, %	Protein, %	Ash, %	Ether extract, %	Crude fiber, %	N.F.E., %	Carotene, mgs. per lb.
Colby:								
Sorghum silage	72.14	27.86	1.71	2.42	0.59	6.60	16.54	1.0
Alfalfa hay	5.2	94.8	13.69	7.65	1.68	26.78	45.90	29.2
Sorghum grain								
Dryland	8.5	91.5	9.81	0.91	0.99	0.92	78.87	....
Irrigated	8.5	91.5	10.84	0.93	1.91	1.91	75.91	....
Garden City:								
Sorghum silage	69.0	31.0	1.76	2.42	0.65	7.45	18.72	2.0
Alfalfa hay	6.9	93.1	19.18	9.14	1.55	24.90	19.18	24.9
Sorghum grain	10.7	89.3	8.52	0.77	3.93	1.93	74.15	....
Manhattan:								
Sorghum silage	65.60	34.4	3.15	2.98	1.01	8.52	18.74	2.0
Alfalfa hay	6.50	93.5	16.71	7.32	2.41	24.74	42.82	17.6
Sorghum grain	12.10	87.9	9.97	0.95	2.76	1.47	72.75	....
Mound Valley:								
Sorghum silage	71.70	28.3	1.88	1.91	0.63	6.44	17.42	1.0
Alfalfa hay	6.70	93.3	18.58	9.63	1.82	22.70	40.57	8.8
Sorghum grain	11.30	88.7	9.46	1.02	1.53	2.34	74.35	....

Nutritive Value of Forages as Affected by Soil and Climatic Differences (Project 430), Progress Report.

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This is a progress report on the third test to determine whether there is a difference in the performance of beef steers due to location, soil, climate, rainfall and/or feed produced in farm areas of Kansas: Colby, Garden City, Manhattan, and Mound Valley. Forty-eight Hereford steer calves averaging 475 pounds and from the same herd (Warner's, near Alden and Sterling, Kansas) as steers used in the second test were divided into four groups of 12 animals. One lot was assigned to each of the four locations. The test is being conducted in the same manner as the two previous tests except that concrete has replaced soil floors under the sheds. Feed analyses are shown in Table 39 and results of the wintering phase in Table 37. The animals are now being finished for slaughter.

Note: Some observations are being made on the performance of Angus and Hereford cross at Colby; Charolais-Hereford and Charolais-Angus crosses at Garden City; and Holsteins at Mound Valley. Valid comparisons cannot be made because of source and ancestry of animal samples being used. The results of the wintering phase are shown in Table 38. The animals are being finished for slaughter in the same manner as animals in the regular project.

Table 37
Feed lot results for wintering phase, November 13, 1964, to March 5, 1965—112 days.

Location	Colby		Garden City		Manhattan		Mound Valley	
Lot no.	1	2	1	2	1	2	1	2
No. steers per lot	6	6	6	6	6	6	6	6
Av. initial wt., lbs.	475	475	475	477	476	476	471.8	479.2
Av. final wt., lbs.	615	612	598.2	602.2	620	607.5	662.2	672.2
Av. daily gain, lbs.	1.25	1.22	1.10	1.12	1.29	1.18	1.70	1.72
Av. daily ration, lbs.:								
Sorghum silage	28.9	30.9	23.6	24.2	22.0	22.0	24.6	26.3
Alfalfa hay	4.5	3.7	4.7	4.9	4.9	5.0	4.7	4.2
Feed per cwt. gain, lbs.:								
Sorghum silage	2316	2540	2147	2137	1712	1875	1445	1525
Alfalfa hay	363	302	399	429	383	424	276	246
Total dry matter per cwt. gain, lbs.	1085	1100	1130	1154	964	1060	779	779
Feed cost per cwt. gain	$13.80	$13.94	$13.58	$13.91	$11.64	$12.80	$9.23	$9.18

Table 38
Feed lot results for wintering phase, November 13, 1964, to March 5, 1965—112 days.

Location	Colby		Garden City		Manhattan		Mound Valley
Lot no.	III	IV	III	IV	....	....	III
Animals	Angus x Hereford (steers)	Angus x Hereford (heifers)	Charolais x Hereford	Charolais x Angus	....	....	Holstein
No. of animals	6	6	6	6	....	....	6
Av. initial wt., lbs.	487.5	423.3	499	485	....	....	410.3
Av. final wt., lbs.	598	537	653.5	621.8	....	....	589.2
Av. daily gains, lbs.	1.2	1.16	1.38	1.22	....	....	1.60
Av. daily ration, lbs.:							
Sorghum silage	32.0	26.2	29.6	24.7	....	....	31.0
Alfalfa hay	3.6	4.2	4.9	4.7	....	....	5.0
Feed per cwt. gain, lbs.:							
Sorghum silage	2848	2264	2136	2006	....	....	1940
Alfalfa hay	324	359	346	381	....	....	310
Total dry matter per cwt. gain, lbs.	1219	1065	1078	1063	....	....	988
Feed cost per cwt. gain	$15.44	$13.55	$12.87	$12.78	....	....	$11.64

Table 39
Feedstuff Analyses

	Dry matter, %	Moisture, %	Protein, %	Ash, %	Ether extract, %	Crude fiber, %	N.F.E.	Carotene, mgs. per lb.
Colby:								
Sorghum silage	32.09	67.91	1.95	2.01	0.66	6.86	20.61	2.28
Alfalfa hay	94.17	5.83	17.01	9.70	1.84	30.25	35.37	9.23
Sorghum grain	88.54	11.46	10.71	2.86	1.05	1.09	72.83	....
Garden City:								
Sorghum silage	35.77	64.23	1.58	2.57	0.52	5.67	25.43	3.05
Alfalfa hay	90.80	9.20	13.46	8.89	2.57	29.97	35.91	37.60
Sorghum grain	87.28	12.72	9.23	1.06	1.39	1.82	73.58	....
Manhattan:								
Sorghum silage	35.77	64.23	1.84	1.29	0.70	6.87	25.07	1.07
Alfalfa hay	91.73	8.27	22.54	7.48	2.57	26.59	32.55	5.34
Sorghum grain	87.32	12.68	10.19	1.78	2.38	1.84	71.19	....
Mound Valley:								
Sorghum silage	35.77	64.23	2.47	1.90	0.67	7.15	23.58	0.72
Alfalfa hay	94.96	5.04	19.96	5.96	2.75	33.46	32.84	5.11
Sorghum grain	88.34	11.66	9.69	1.55	2.66	1.89	72.48	....

Influence of Nitrogen Source on Ruminal pH, Ammonia Production and Protein Synthesis (Project 596).

L. H. Harbers, D. Richardson, and R. K. Abe

Previous reports from this station indicate little advantage in feeding combined sources of protein (soybean meal and cottonseed meal) to beef cattle. The results were obtained by determining total nitrogen and protein nitrogen in the rumen of fistulated steers at six hours after feeding. By this technique, data that express the ability of the microorganisms to convert nitrogen to bacterial protein may be rapidly determined. Bacterial protein has high biological value; it is, thus, important that maximum conversion be obtained from nitrogen sources of less biological value. Factors that influence conversion can be carefully controlled using fistulated animals. Once optimum rations are formulated under such conditions of rapid screening, costly feeding trials can be minimized.

Steers fitted with ruminal cannulae were used to study the effect of nitrogen source on ruminal pH, ammonia production, crude protein, and true protein. Soybean meal, cottonseed meal, and urea were the sources of supplemental nitrogen to a basal ration of prairie hay, salt, and steamed bone meal (Table 40). Tests were conducted with and without added grain. Rations within each test contained the same amounts of nitrogen and had the same caloric value.

Results and Discussion

Measurement of ruminal pH is an indication of the amount of acid formed during fermentation following feeding. A pH value of less than 7 indicates acid conditions; a value above 7 indicates alkalinity. Data from these investigations (Figure 1) show no significant differences in pH due to nitrogen source. When grain is added, the values are somewhat lower due to the added carbohydrate that is fermented to volatile fatty acids.

Ammonia arising in the rumen is one of the end products of bacterial degradation of feedstuff protein and may be used to synthesize bacterial protein. As seen in Figure 2, the amounts produced from the oil meals do not differ. Those levels of ammonia are capable of being utilized by the bacteria. In the case of urea, most of the ammonia is produced during the first two hours. Those amounts are much greater than the bacteria are able to utilize during that short time. Some ammonia is lost due to absorption by the rumen and is then detoxified to urea by the

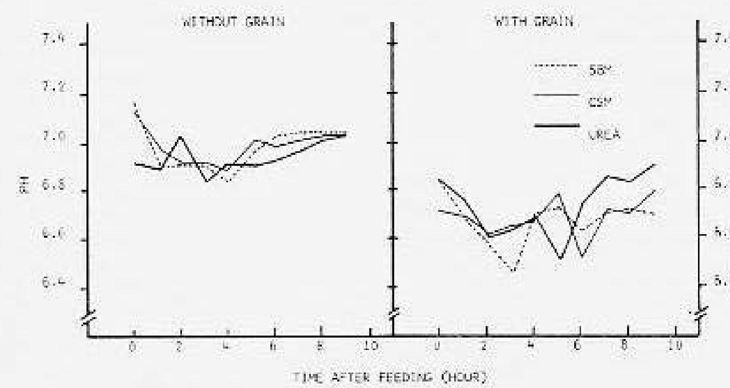

Fig. 1.—Average pH values of rumen liquor from three fistulated steers.