Table 18
Feedlot results for wintering phase.
November 21, 1962, to March 19, 1963—118 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.	448	448	449	448	449	449	449	448
Av. final wt., lbs.	585.8	567.5	588.3	584.8	581.7	592.5	611	611
Av. daily gain, lbs.	1.17	1.01	1.18	1.16	1.12	1.21	1.37	1.38
Av. daily ration, lbs.:								
Sorghum silage	24	24	22	22	23	23	30	29
Alfalfa hay	5	5	5	5	5	5	5	5
Feed per cwt. gain, lbs.:								
Sorghum silage	2,082	2,376	1,853	1,873	2,045	1,895	2,187	2,135
Alfalfa hay	418	490	422	430	445	412	365	363
Dry matter per cwt. gain, lbs.:								
Sorghum silage	618	706	584	590	644	597	538	525
Alfalfa hay	397	465	401	408	423	391	347	345
Total dry matter per cwt. gain, lbs.	1,015	1,171	985	998	1,067	988	885	870

Table 19
Feedstuff analysis.

	Moisture %	Dry matter %	Protein %	Ash %	Crude fiber %	Ether extract %	N.F.E. %	Carotene mgs./lb.
Colby:								
Sorghum silage	71.80	28.20	1.82	2.61	5.07	0.84	17.86	8
Alfalfa hay	5.00	95.00	15.50	6.41	33.32	1.40	38.37	14
Garden City:								
Sorghum silage	68.56	31.44	1.33	2.00	3.17	0.48	24.46	1
Alfalfa hay	5.00	95.00	14.28	9.19	29.97	1.62	39.94	38
Manhattan:								
Sorghum silage	68.49	31.51	1.95	1.54	7.38	0.75	19.89	2
Alfalfa hay	5.00	95.00	11.98	3.11	35.67	1.19	43.05	10
Mound Valley:								
Sorghum silage	75.96	24.04	1.80	1.61	3.95	0.39	16.29	2
Alfalfa hay	5.00	95.00	13.67	5.79	31.01	1.41	43.12	7

Nutritive Value of Forages As Affected by Soil and Climatic Differences (Project 430).

D. Richardson, E. E. Banbury,[1] A. B. Erhart,[2] F. E. Davidson,[2] Grady Williams,[3] E. F. Smith, F. W. Boren and R. F. Cox

Some persons think performance of cattle may differ in various parts of the state due to location, soil, climate, rainfall and/or feed produced. This test is an attempt to determine whether such differences exist and, if so, to measure them.

Forty-eight Hereford steer calves from the same herd and averaging 448 pounds were divided as uniformly as possible into four lots of 12 animals. One lot was assigned to each of four locations: Colby, Garden City, Manhattan, and Mound Valley. Uniform-size concrete lots with sheds are being used at each location. The animals were subdivided into two groups of six animals. The ration consisted of sorghum silage fed to limit of appetite and 5 pounds of second-cutting alfalfa hay per head daily. Salt was the only mineral supplied and water was available in automatic electrically heated waterers.

Results of the wintering phase are shown in Table 18 and feedstuff analyses in Table 19. Silage has been removed from the ration and replaced by a full feed of sorghum grain. Final results will be obtained at time of slaughter—probably September.

1. Colby Experiment Station.
2. Garden City Experiment Station.
3. Mound Valley Experiment Station.

Quantitative Determination of the Amino Acid Content of Rumen Fluid from Twin Steers Fed Soybean Oil Meal or Urea (Project 596).

D. Richardson and W. S. Tsien

Crude protein, or protein as the term is commonly used, represents all nitrogen-containing compounds in the feed. True protein is that portion of the protein which has been formed by the combining of amino acids. The value of any protein supplement is determined by its amino acid content plus the ability of the animal to synthesize true protein in the digestive tract from nonprotein-nitrogen sources. The purpose of this test was to determine the amino acid content of rumen fluid of steers fed soybean oil meal or urea.

Two pairs of fistulated identical twin steers were fed the same daily ration of 1 pound alfalfa hay, 4 pounds prairie hay and 5 pounds cracked corn. One of the steers in each pair was supplemented with 1 pound of soybean oil meal; the other, with 60 grams of urea and an additional pound of corn. One-half of the ration was fed at 7 a.m. and the other half at 5 p.m. Samples of rumen contents were taken after the steers were maintained on these rations for 63 days. Four 200-ml. strained samples were taken at 7 a.m. before feeding, 10 a.m., 1 p.m., and 4 p.m. The 800-ml. combined sample was dried at about 90° C. and ground in a Wiley Mill preparatory for analysis.

The technique of sampling in this experiment should have eliminated the time factor in protein synthesis because the samples were withdrawn at selected intervals during the day. Hereditary differences were considered to have been eliminated from the comparisons by using identical twins. The adjustment period of 63 days should have eliminated any carryover effect from the previous ration and allowed sufficient time for the microorganisms to adapt themselves to urea.

The results are shown in Table 20. All amino acids were present in greater quantities from steers supplemented with soybean oil meal. Also, amino acids accounted for 13 percentage units more of the total crude protein per liter when soybean oil meal was used as the protein supplement (56.3 vs. 43.3 and 61.2 vs. 48.0). The results show that true protein is produced from urea but the total true protein available for the animal is less than when soybean oil meal is supplied on an equal nitrogen intake. These results help explain the fact that feeding results with urea and other nonprotein-nitrogen are usually not quite so good as when natural or true protein is used.

Table 20

Amino acid content of rumen fluid from twin steers fed soybean oil meal or urea.[1]

Supplemental nitrogen	1 lb. soybean oil meal		60 gms. urea	
Steer	W1	R1	W2	R2
	Mgs. amino acid per liter[2]			
Aspartic acid	346.03	382.19	305.76	242.01
Threonine	173.09	199.75	154.06	84.32
Serine	137.38	150.73	97.74	32.52
Glutamic acid	496.91	517.14	491.60	377.24
Proline	299.62	283.42	251.63	190.78
Glycine	168.93	168.02	148.88	112.84
Alanine	190.35	213.52	189.78	149.32
Methionine	89.75	93.73	79.52	71.89
Isoleucine	229.40	249.98	197.85	156.80
Valine	197.46	213.52	189.78	149.32
Leucine	291.69	303.31	254.42	220.90
Tryosine	151.38	156.91	99.54	79.55
Phenylalanine	253.13	277.98	150.92	126.69
Histidine	67.50	77.58	62.74	53.83
Lysine	300.13	305.91	273.54	227.42
Arginine	139.04	152.56	137.34	101.34
Tryptophan	78.20	129.23	55.99	45.78
Cystine and cysteine	52.22	54.34	37.59	29.11
Grams crude protein/liter	6.514	6.376	7.310	5.146
Total grams amino acid/liter	3.666	3.903	3.168	2.471
% A.A. of total C.P./liter	56.3	61.2	43.3	48.0

1. Daily ration per steer (½ fed 7 a.m., ½ fed 5 p.m.)
1 lb. alfalfa hay.
4 lbs. prairie hay.
5 lbs. cracked corn (6 lbs. for those receiving urea).

2. Four 200-ml. strained samples were taken at 7 (before feeding), 10, 1 and 4 o'clock. Determinations were made on the composite sample. Urea was fed 63 days before samples were obtained.

Improving Beef Cattle Through Breeding Methods (Project 286).

W. H. Smith, J. D. Wheat and H. G. Spies

The purebred Shorthorn cattle breeding program was continued during 1962 without modification of breeding plans. Inbreeding was continued in the two lines. The Wernacre Premier line is in its fifth generation and the Mercury line, its fourth generation of inbreeding. No outside breeding or outcrossing has been introduced in eather line since the project was initiated in 1949. The inbreeding plan has been basically to continue successive generations of half-sibbing in both lines.

This project was initiated to study the inheritance of production traits in beef cattle, to evaluate the effects of inbreeding in beef cattle, and to explore the feasibility of using inbred lines of beef cattle to improve production traits.

Many individual animal production data have been collected on all cattle produced in the project as it has progressed. No extensive line cross-

Table 21

Summary of the 1961 Shorthorn calves of the Wernacre Premier and Mercury lines.

Tag no.	Coefficient of inbreeding	Birth weight	Weaning weight	Weaning score	Days fed	Initial weight	Final weight	Total gain	Average daily gain	Final score	Pounds corn per cwt. gain	Pounds alfalfa per cwt. gain
						Wernacre Premier Line, Bulls						
3	28.01	86	370	2—	182	400	930	530	2.91	2+	356	182
4	29.81	67	335	2	182	370	890	520	2.86	2	381	189
12	23.74	64	320	2—	182	320	785	465	2.55	2—	429	217
Average	27.19	72	342	2—	......	363	868	505	2.77	2	389	196
						Heifers						
21	28.27	68	320	2—	182	345	700	355	1.95	2+	393	349
52	34.05	54	185	2—	182	196	490	294	1.62	3—	352	337
56	33.05	74	285	2	182	308	650	342	1.88	2	393	345
68	34.05	59	294	3—	182	294	574	280	1.54	3—	439	407
72	30.25	76	348	3+	182	348	740	392	2.15	2	389	327
Average	31.93	66	286	2—	......	298	631	333	1.83	2—	393	353
						Mercury Line, Bulls						
1	16.24	77	355	2+	182	384	953	569	3.13	1	366	178
2	15.92	72	370	2	182	395	790	395	2.17	2	443	237
11	11.77	70	358	2—	182	358	881	523	2.87	2	410	203
15	15.92	75	376	2	182	376	920	544	2.99	2+	406	197
Average	14.96	74	365	2	......	378	886	508	2.79	2+	406	204
						Heifers						
6	7.18	65	285	2	182	296	650	354	1.95	1—	362	322
7	6.25	72	370	1—	182	382	730	348	1.91	1	422	374
8	6.25	65	360	2	182	370	710	340	1.87	2	444	394
10	20.19	50	325	2+	182	350	735	385	2.12	1	430	379
13	19.99	63	290	2—	182	303	628	325	1.79	2—	437	394
14	15.92	64	305	2—	182	317	670	353	1.39	2—	504	448
36	18.25	55	320	2	182	336	705	369	2.03	2	393	352
87	19.23	65	252	2—	182	252	620	368	2.02	2—	306	310
146	20.24	70	357	2—	182	357	745	388	2.13	2	348	351
189	21.25	62	357	2	182	357	686	329	1.81	1—	357	383
194	20.29	64	241	2	182	241	603	362	1.99	2—	348	331
Average	15.91	63	315	2	......	324	680	356	1.91	2	396	367