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	154.96	84.32
Serine	137.38	150.73	97.74	32.52
Glutamic acid	496.91	517.14	491.60	377.24
Froline	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	28.91	86	379	2	182	406	930	530	2.91	2	356	182
4	29.81	67	335	2 2	182	370	890	520	2.86	2 2	381	189
12	23.74	64	320	2 2	182	320	785	465	2.55	2 2	429	217
Average	27.19	72	342		.....	363	868	505	2.77		389	196
Heifers												
21	28.27	68	320	1 1	182	345	700	355	1.95	+ 1	393	349
52	34.05	54	185	2 2	182	196	490	294	1.62	2 2	352	337
56	33.05	74	285	2 2	182	308	650	342	1.88	2 2	393	345
68	34.05	59	294	3 3	182	294	574	280	1.54	1 1	439	407
72	30.25	76	348	3 3	182	348	740	392	2.15	2 2	389	327
Average	31.93	66	286	2 2	.....	298	631	333	1.83	2	393	353
Mercury Line, Bulls												
1	16.24	77	353	2 2	182	384	953	569	3.13	1 1	366	178
3	15.93	72	370	2 2	182	395	790	395	2.17	2 2	443	237
11	11.77	70	358	2 2	182	358	881	523	2.87	2 2	410	203
15	15.92	75	376	2 2	182	376	920	544	2.99	2 2	406	197
Average	14.96	74	365	2 2	.....	378	886	508	2.79	2	406	204
Heifers												
6	7.18	65	285	2 1	182	296	650	354	1.95	1 1	362	322
7	6.25	72	370	1 2	182	382	730	348	1.91	1 2	422	374
8	6.25	65	360	2 2	182	370	710	340	1.87	2 1	444	394
16	20.19	50	325	2 2	182	350	735	385	2.12	1	430	379
13	19.99	63	290	2 2	182	303	628	325	1.79	2 2	437	394
14	15.92	64	305	2 2	182	317	670	353	1.39	2 2	504	448
36	18.25	55	320	2 2	182	336	705	369	2.03	2 2	393	352
87	19.23	65	252	2 2	182	252	620	368	2.02	2 2	366	310
146	20.24	70	357	2 2	182	357	745	388	2.13	2	348	351
186	21.25	62	357	2 2	182	357	686	329	1.81	1 1	357	383
194	20.29	64	241	2 2	182	241	603	362	1.99	2 1	348	331
Average	15.91	63	315	2 2	.....	324	680	356	1.91	2	396	367

ing has been attempted to date because of the relatively low level of inbreeding which has prevailed and the limited number of breeding animals in the project.

The management of the experimental cattle includes weighing each cow and calf immediately following parturition. Summer pasture breeding is practiced and the calves are born during the spring of each year. The cows are wintered on dry native grass. The calves are not creep fed during the suckling period. All calves are weaned, weighed, and scored for type when they are approximately six months old and the standardized weaning age for weaning weight correction is 180 days. The calves are placed on individual feeding trials for record-of-performance tests for 182 days shortly after they are weaned. Body weight gain and feed consumption records are maintained on all calves during the feeding period. The calves are scored for type or conformation as yearlings when they complete the prescribed feeding test.

The full-feed ration for the bulls consists of 75% cracked corn and 25% chopped alfalfa hay; that for the heifers, 55% cracked corn and 45% chopped alfalfa hay. All calves are fed twice daily by means of individual feeders while the feed tests are in progress.

Production data for the 1961 calves are summarized in Table 21. The 1961 calves had not completed their feeding test at the time of this report, so production data for them are not included. Thirty-four calves of the 1962 calf crop are being individually fed.

Swine

Kansas Swine Improvement Association Testing Station
Berl A. Koch and Wendell A. Moyer

The boar testing program was changed to a slaughter-pig testing program a year ago. The testing station committee of the Association made the change because of the difficulty in identifying carriers of infectious atrophic rhinitis. In the group of boars tested during the winter of 1961-62, one of the better performing boars showed positive symptoms of infectious atrophic rhinitis soon after he sold. Yet he had shown no symptoms of infection while on test.

Table 22 lists data collected during the summer 1962 test. In every case, two litter mate pigs were fed in a pen. The pigs received ration S-35-A until they weighed approximately 150 pounds when they were changed to ration S-47. Ration compositions are shown in Table 23. Average testing cost per pig was $34 and the average return per carcass was $36. Twenty of the 42 pigs on test met or exceeded carcass certification requirements.

Table 24 lists data collected during the winter 1962-63 test. Pigs in this test received ration S-35-A throughout the growing-finishing period. Average testing cost per pig was $25 and the average return per carcass was $32. Fourteen of the 38 pigs on test met or exceeded carcass certification requirements.

Tables 25 and 26 list testing costs in some detail.