Table 15 (Continued)

Carcass data					
Av. area ribeye, sq. in. ..	9.01	9.65	9.70	9.83	9.51
Av. fat thickness at 12th rib, in.	0.88	0.83	0.90	0.83	0.93
Av. carcass grade:	18.4	17.8	19.2	18.5	18.4
Choice + = 21	1		2		
Choice = 20		1	2	2	2
Choice − = 19	2	1	2	4	1
Good + = 18	6	4	4	1	6
Good = 17	1	3		3	1
Good − = 16		1			

1. Each lot supplemented with 10,000 I.U. vitamin A and 30 gms. calcium carbonate per head daily. Salt fed free choice; none of these included in feed cost.

2. Feed costs are on page 72.

3. Initial wt. x $24 per cwt.

4. Feed cost per cwt. gain x total gain.

5. Carcass wt. x carcass grade price: Choice, $43.25; good, $40.50.

Effects of Field-conditioned Alfalfa Hay on the Winter Performance of Weaned Heifer Calves, 1962-63 (Project 370).

F. W. Boren, E. F. Smith, D. Richardson, G. E. Fairbanks

This feeding trial was to determine the effects of various field-conditioned alfalfa hays on the winter performance of heifer calves.

Second-cutting alfalfa was field-conditioned or processed as follows:

1. Control—mowed, raked, baled.
2. Crushed—mowed, crushed with one smooth steel roll and a spiral-grooved rubber roll, raked and baled.

Table 16

Winter performance of weaned heifer calves fed alfalfa hay field-cured by various methods.

December 12, 1962, to March 8, 1963—93-day wintering period.

Lot no.	13	14	15	16	17
No. heifers per lot	10	10	10	10	10
Hay-conditioning method	Control	Crushed	Rotary cut	Swathed, crimped	Wafered
Initial wt. per heifer, lbs.	438	441	442	443	442
Av. gain per heifer, lbs.	102	110	98	121	119
Final wt. per heifer, lbs.	540	551	540	564	561
Av. daily gain per heifer, lbs.	1.10	1.18	1.05	1.30	1.28
Av. daily ration, lbs.:					
Alfalfa hay	11.8	13.1	11.3	11.9	13.0
Ground sorghum grain, lbs.	3.5	3.5	3.5	3.5	3.5
Lbs. feed per cwt. gain:					
Alfalfa hay	1072.7	1110.2	1076.2	915.4	1015.6
Ground sorghum grain, lbs.	318.2	296.6	333.3	269.2	273.4
Total lbs. feed required per cwt. gain	1390.9	1406.8	1409.5	1184.6	1289.0
Feed cost per cwt. gain[1]	$16.46	$16.44	$16.76	$14.00	$15.08

1. Feed costs on page 72.

3. Rotary cut—a 12-foot, trail-behind, twin-rotor rotary mower that cut, lacerated, and windrowed the hay in one operation, baled.

4. Swathed, crimped—a 12-foot, self-propelled windrower with a crusher-crimper attachment, baled.

5. Wafered—Alfalfa cut with a flail-type cutter, field dried to about 15% moisture in windrows, wafered with a Massey-Ferguson wafering machine.

Fifty head of choice Hereford heifer calves were used in this study, allotted 10 head per lot, and fed alfalfa free choice, plus 3.5 pounds of rolled sorghum grain per head per day. Salt was available at all times.

Observations

Data are given in Table 16. There was no apparent reason for the difference in average daily gain of heifers in the various lots. Calves fed wafers rapidly adjusted to that type of hay-package and were apparently satisfied with wafers as a source of roughage.

Vitamin A and Dehydrated Alfalfa Fed Individually and in Combination with and without Aureomycin in a Steer Fattening Ration (Project 567).

D. Richardson, E. F. Smith, F. W. Boren and Keith Kingsley

Hereford yearling steers in this test were used in a previous bluestem pasture grazing test. After the grazing test was completed, they were assigned to six lots of 10 animals each on the basis of weight and uniformity to compare the value of dehydrated alfalfa as a source of vitamin A with preformed vitamin A, both individually and in combination with and without Aureomycin. The supplements supplied the same amount of protein, calcium and phosphorus in each lot. Vitamin A value of carotene was figured on the dehydrated alfalfa at 400 I.U. per milligram of carotene; 10,000 I.U. of vitamin A per head was fed daily for the first 84 days and 15,000 I.U. units for the remainder of the test; 70 milligrams of Aureomycin was fed per head daily. After the steers were on feed, silage was limited to 20 pounds per head daily; however, grain was fed **ad lib.**

Results and Observations

The results of this test are presented in Table 17.

(1) Dehydrated alfalfa produced greater gains than preformed vitamin A (compare Lots 7 and 9).

(2) A combination of dehydrated alfalfa and vitamin A was no better than either alone (compare Lot 11 with 7 and 9).

(3) Aureomycin apparently was beneficial with a combination of dehydrated alfalfa and vitamin A but not when used with each individually (compare Lot 12 with 8 and 10). We have no satisfactory explanation for these results.

(4) Liver storage of vitamin A was greatest with animals fed preformed vitamin A; however, there was no relationship between liver storage of vitamin A and gains of individual animals.

(5) No deficiency symptoms or differences in appearance attributed to vitamin A were observed.

(6) Feed cost and efficiency favored lots making the greatest rate of gain.

(7) There were no significant differences in dressing percentage, carcass grade or carcass characteristics.

The following is a 114-day progress report on a repeat of this test, except 15,000 I.U. of vitamin A per head daily has been used throughout the test.

Lot no.	7	8	9	10	11	12
Av. starting wt., lbs.	862	860	860	856	862	857
Av. daily gain, lbs.	2.86	2.96	3.00	3.02	2.88	3.19

Table 17
Vitamin A and dehydrated alfalfa fed individually and in combination with and without Aureomycin.
November 30, 1961, to July 7, 1962—220 days.

Lot no.	7	8	9	10	11	12
No. steers per lot	10	10	10	10	10	10
Av. initial wt., lbs.	708	708	708	708	710	708
Av. final wt., lbs.	1206	1179	1233	1180	1208	1235
Av. daily gain, lbs.	2.26	2.14	2.39	2.14	2.26	2.40
Av. daily ration, lbs:						
Sorghum silage	20.4	19.6	20.4	19.8	20.9	20.0
Sorghum grain	18.1	18.1	18.7	18.7	18.8	18.7
Supplement	1.3	1.3	1.7	1.7	1.7	1.7
Dehyd. alfalfa[1]	No	No	Yes	Yes	Yes	Yes
Vitamin A[2]	Yes	Yes	No	No	Yes	Yes
Aureomycin[3]	No	Yes	No	Yes	No	Yes
Feed per cwt. gain, lbs:						
Sorghum silage	902	917	853	926	926	836
Sorghum grain	799	846	786	874	833	782
Supplement	58	61	72	81	76	72
Feed cost per cwt. gain	$19.54	$20.82	$19.17	$21.44	$20.46	$19.38
Dressing %, feedlot wt.	62.3	62.4	62.3	62.7	61.8	62.2
Av. hot carcass wt., lbs.	752	736	769	740	747	769
Est. kidney knob, % carcass	3.9	3.3	3.4	3.8	3.4	3.5
Av. finish:						
Fat thickness 12th rib, in.	.71	.76	.69	.70	.77	.62
Distribution[4]	2.7	2.7	2.3	2.6	2.9	3.1
Degree marbling[5]	6.0	6.3	5.9	5.4	6.1	5.2
Degree firmness[6]	2.3	3.1	2.5	2.2	2.7	2.8
Fat color[7]	2.6	2.6	2.0	2.2	2.4	2.7
Size ribeye, sq. in.	11.8	11.6	12.2	12.1	11.5	12.2
Carcass grades:						
Low prime	..	..	..	1	..	..
Top choice	..	..	..	1	1	4
Av. choice	2	..	1	3	2	2
Low choice	6	6	6	3	3	2
Top good	1	4	2	2	2	2
Av. good	..	..	1	..	2	..
Low good	1	..	..	..	..	..
Yield grades:						
3	3	2	4	3	5	4
4	6	8	4	5	3	6
5	1	..	2	2	2	..
Vitamin A per gram liver, I.U.	32	24	13	12	26	21

1. 0.4 lb. first 84 days; 0.6 lb. thereafter.
2. 10,000 I.U. first 84 days; 15,000 I.U. thereafter.
3. 70 milligrams per head daily.
4. 2 = uniform, 3 = moderately uniform, 4 = modestly uniform.
5. 5 = moderate amount, 6 = modest amount, 7 = small amount.
6. 1 = very firm, 2 = firm, 3 = moderately firm.
7. 1 = white, 2 = creamy white, 3 = creamy, 4 = slightly yellow.

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. Bunbury,[1] A. B. Erhart,[2] F. E. Davidson,[3] Grady Williams,[1] 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